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LIGHT ✦ HEAT ✦ POWER ✦ BYE-PRODUCTS

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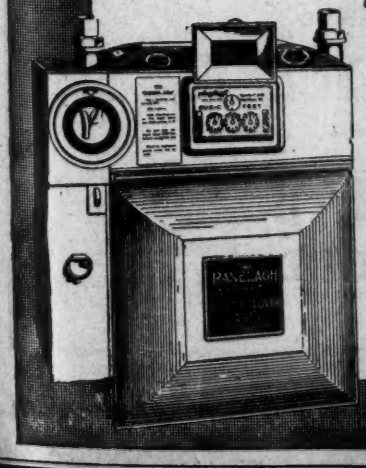

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VOL. CLXXII., No. 3266.] WEDNESDAY, DECEMBER 16, 1925. [77TH YEAR.

EDITORIAL NOTES.

Strange Parliamentary Position.

WE know that the Electricity Commissioners are not favourably inclined to gas undertakings being the suppliers of electricity in the areas in which they are already established in business—in fact, we can barely avoid the conclusion that they would, if they could, move heaven and earth, including the British Parliament, to prevent anything of the kind happening. The only object we can see in such an attitude is to provide larger opportunities for suppliers of electricity in bulk. Whether or not this is in the interests of a locality is open to question, or, at any rate, to discussion of the balance of advantage of having, on the one hand, an established organized business in the locality with fuel and waste heat resources for economically generating current, or taking a supply from a large generating station with all the transmission costs attached to those for generation. A strange position has been created over the question of supplying the Horley district with electricity, which indicates that the economies in electricity supply which can be offered by a gas company are departmentally thrown aside, as being of no account, in favour of making electricity supply an electrical preserve into which others shall not enter; and, in pursuance of this policy, unless we are much mistaken, the Electricity Commissioners—though a subordinate department—have managed somehow to get the Ministry of Transport and the Government on a piece of string, and lead them just as they think proper. So much so has this developed that there are members of both Houses who appear to have come to the conclusion that the obtaining of the approval of Parliament to Special Orders passed by the Electricity Commissioners has become nothing short of a farce, just as (we feel) the appearance before the Commissioners of a gas company either in opposition to a Special Order or in support of one can, with before us the pronounced views of the Commissioners, be described by the same term.

Before dealing with what took place in the Lords last week, on the motion for the approval of the Horley District Electricity Order, let us, seeing that some important considerations of procedure and policy are raised, review the situation as created by the Horley controversy. It will be remembered that the Gas Company promoted a Bill in which they asked for electricity supply powers. They did this owing to the Statutory Gas Companies (Electricity Supply Powers) Act not having been passed. It was well known that the Gas Company intended to promote their Bill. As a matter of fact, the Electricity Commissioners were informed of the promotion in July, 1924—months before the Electricity Supply Company was promoted. Consequently, when this Company introduced their Order, the Gas Company sent in objections, but were not invited to appear before the Electricity Commissioners. The Commissioners granted the Electricity Order, and immediately advanced it for confirmation. The position thus created was well described by a member of the Commons Committee to whom the Gas Company's Bill was referred after it had been passed by a Committee of the House of Lords presided over by the Earl of Clarendon. The honorable member said: "There seems to be a contest here be-"tween the Electricity Commissioners and the Houses of "Parliament as to who shall decide between the two com-"peting parties on this particular Bill." Nevertheless the Commons Committee rejected the Gas Company's scheme, though approved by the Lords Committee. Whether or not the Commons Committee were influenced by a report of the Minister of Transport cannot be said; but the fact remains that that report was distinctly in favour of the Electricity Commissioners' decision to pass the Electricity Company's Special Order—Commissioners whose work is supposed to be of a judicial order, but who had already made public their intentions regarding combined gas and electricity supply schemes, which intentions are not likely to be altered by the passing by Parliament of the Statutory Gas Companies (Electricity Supply Powers) Act. The expressed views of the Commissioners on the subject are:

> They think there may be cases where it is right and proper that the supply of electricity may be entrusted to a gas company, because in some cases it may be the only means by which a district can get a supply of electricity—the prospects may be so poor that no body or company, except the gas company, may be able to deal with the situation. Therefore the Commissioners would not consider that a proposal to entrust electricity powers to a gas company should be opposed on principle; but they recognize what must be perfectly obvious to everybody that, on general grounds, it is preferable that the supply of electricity should, where a company or body of people are able and willing to undertake it, be in the hands of the body whose primary and sole duty should be the supply of electricity.

Here we have definite evidence of the attitude of the Electricity Commissioners to the combination of gas and electricity supplies; and the position that has been created by the Horley electricity schemes shows an attempt to render nugatory the controlling power of Parliament in this matter. There can be no other interpretation of what took place in the House of Lords; and, as previously indicated, there are signs of the so-called "controlling power" of Parliament being reduced, where the Ministry of Transport and the Electricity Commissioners are concerned, to a perfect farce. It seems to us, to say the least, that high-handed procedure has been adopted by the Electricity Commissioners in matters coming within their province which appertain to the gas industry.

What happened in the House of Lords is reported elsewhere in this issue. But, briefly put, it amounts to this: Approval of the Electricity Company's Special Order was moved by Viscount Peel, whereupon the Earl of Clarendon moved that, having regard to the decision of the Committee of the House who had considered the Gas Company's Bill, the Electricity Company's Special Order be not approved. It transpired in the course of the long discussion that the Electricity Company's Special Order as considered by the Electricity Commissioners provided for a generating station, but now there is talk of a bulk supply being available, and the new Company acting as distributors. This suggests that bulk supply was the battering-ram introduced for the purpose of dealing with any opposition to the progress of the Order. It was not in the Order as introduced; it was an eleventh-hour revision with a special purpose. The reproof administered by the Lord Chairman (the Earl of Donoughmore) as to the manner in which the Order had been conducted was well deserved; and what he says fully justifies the impression that the Ministry of Transport, spurred on by the Electricity Commissioners, have all through been partisans in the matter. Then came the suggestion from the Lord Chairman that, as the Gas Company were re-introducing

their Bill, it and the Order should be referred to a Joint Committee of both Houses. It was urged by Viscount Peel that the House should not take that course, but should, if willing to do so, pass the Order at once. On an intimation by Earl Clarendon that he should press the matter to a decision, the Marquess of Salisbury announced that the Government would naturally support Viscount Peel, who represented the Ministry of Transport.

This raises a very important issue—viz., whether the Government ought to threaten to put on their Whips with the object of forcing through the House of Lords an Order which has, in effect, been rejected by a Committee of that House. If this is the sort of thing that is to be applied, it sweeps aside completely the safeguard which the Legislature has reserved to Parliament against a miscarriage by a Government Department. What it comes to is this: Parliament has reserved to itself the right to maintain control over Special Orders. The Ministry of Transport and the Electricity Commissioners are closely interlinked; and so far as we can learn, the Ministry have never turned-down a single Order of the Electricity Commissioners. Now, when the Government see an Order in jeopardy, they threaten to put on their Whips (as previously remarked) with the view of supporting the Ministry of Transport, and thus the Electricity Commissioners, thereby forcing acceptance by the House. That is not reserving to Parliament control over Special Orders. If this is the sort of thing to which Parliament is to be subjected, then those concerned in Special Orders or (as in this case) in a Private Bill will never know where they are. To say the least, it is a most extraordinary position; and we hope the Lord Chairman and the Earl of Clarendon will not allow the matter to stay where it is. The upshot of the discussion in the Lords was that, in order to give a little more breathing time, the debate was adjourned for a week. But the threat of the Marquess of Salisbury stands.

Uneconomic and Useful Ash.

There is a fine opportuneness about the Cantor Lectures which Dr. R. Lessing has been delivering at the Royal Society of Arts, the third of which was summarized last week. The deliverances exemplify the thoroughness which is always obvious in the work which the lecturer takes in hand; and from the scientific and technical aspects, they illustrate how fragmentary is the knowledge possessed as to ash in coal, how necessary it is that what is latent in regard to it should be revealed by systematic and continuous exploration, and how imperative it is that the whole information should be brought into an ordered state. The opportuneness of the lectures is due to the fact that never in the history of fuel has a greater interest been taken in its efficient and economical use, though, great as is the expansion of interest, we are afraid it is far from being universal. And in the economical use of fuel, coal ash and clean coal are highly important factors. If at the beginning of the lectures Dr. Lessing was "filled with apprehension" in introducing a subject dealing with such a worthless material as coal ash, it must have been dissipated long before he concluded the series. There is certainty that the lectures were a revelation to many that inert coal ash, visibly unimposing as it is in service, is particularly imposing in its disservice to all users—alike in the home and in the factory in their respective degrees, and is guilty of a waste which, if it could be saved, would gladden the heart of the Chancellor of the Exchequer, could he handle the proceeds; anyway, it would confer an inestimable benefit upon the country through the promotion of general economy and efficiency in the use of fuel, and in the work done by it.

Although three lectures were devoted to the subject of "Coal Ash and Clean Coal," Dr. Lessing had to present his material in highly concentrated form; and he was able to do this through his own extended study and research into the physical and chemical characteristics and distribution of ash in coal and the effects of its presence. What is wanted—and the lectures will assist in this—is that the economic importance of this question should be driven well home; and that was the note at the beginning and end of the lectures, and in all that intervenes. Why haul ash, or rather the part of it which could be got rid of from the coal before it leaves the collieries? The lecturer calculates that haulage alone of useless ash costs per annum approximately £4,500,000, and that the country's non-productive expenditure on its account may safely be put at the truly stupendous figure of from £10,000,000 to £20,000,000 a year. How he arrives at either of these last broadly separated figures we do not know; but anyway we should imagine that even the upper one would not be an over-estimate of the disastrously bad effects upon the country of the unwanted ash. What ash means from the monetary point of view to the gas industry cannot be computed, even though we have the fact that taking the average ash in the coals used as 10 p.ct., it would represent the transport and handling by the industry of 1,800,000 tons of useless material, with all its wasteful influence upon capital, plant, labour, and fuel, and degradation of coke.

In the first lecture, there was presented information as to the part that inorganic compounds have in the origin and constitution of coal, and as to the chemical changes which take place in the mineral matter during incineration. In the second lecture, Dr. Lessing took us to the preparation of coal for the market. Incidentally, he expressed the opinion that the high market value of large coal is not due to its physical form, *qua* size, but to the buyer's unconscious knowledge that the fact of the coal remaining unbroken in the operations of mining, handling, and transport is a guarantee of its comparative freedom from ash. The high ash in slack is mainly, if not entirely, due to the greater fragility and friability of the dirt-bands and partings, and these or their fragments get concentrated in the smaller size. Hence the buyer's preference for large coal, which, once secured, he usually proceeds to break up before use, though the coal particles in slack are perhaps as free or freer from ash than the average lump of coal of the same kind. This fact forms the basis of all washing and cleaning processes. Thus in the second lecture the washing and drying of coal, and the dry cleaning of coal received consideration. One important problem connected with the cleansing of coal and of gaining knowledge as to mineral matter contained in it, is that of sampling to gain a fair representation. This is an acknowledged difficulty in view of the distribution of the ash—the percentage varying with the size of lump or particle. It is clear that, without going to some trouble in the matter, a fair representative sample cannot be obtained. As was pointed out in the lecture, the ideal method of drawing samples would require that aliquot portions should be taken from each size according to its contribution to the bulk. But this would involve the obviously impracticable in the case of large consignments—the screening of the whole, and quartering down each screening fraction. Hence we find Dr. Lessing making a plea for the definite establishing of a scientific basis of proper sampling; and that plea we very heartily support from experience of results from diverse samplings. Further accentuation of the want of complete exploration of the subject of coal ash is found when the lecturer deals with the control of coal washing and cleaning processes. Those used or proposed depend on physical laws, the theory of which in many cases is still obscure. Scientific research into these questions has been very small compared with the values involved.

In the third lecture, Dr. Lessing dealt with a matter at which he has been hammering with little success in the way of obtaining acceptance—albeit there appears the probability of a break in this, as some endorsement has come from the work of other experimentalists. The chemical and physical behaviour of ash in combustion processes is examined. This shows that the greater part of the ash has a debasing effect upon the combustibility of solid fuel; but condemnation must not be comprehensive. Every stage in combustibility is shown to be influenced by catalysis; and among the constituents of coal ash are elements which have been proved capable of catalytic activity. The same applies to carbonization. Hence the paramount importance of an intimate knowledge of the composition of ash; and if the influence of the catalytic activity of certain ash constituents is of a material order, and what we have presented in this lecture is substantiated by the work of other explorers, then the premises and deductions attaching to much of the work previously

done upon ash will have to be scrapped or drastically revised. But there will have to be much more research to show precisely where we are in this matter.

A table is given in the third lecture showing the influence of catalysts on the carbonization of coal at 900° C. (clarain and vitrain from Dalton Main). Commenting on the figures, Dr. Lessing says:

> The directive influence of the catalysts upon the balance of solid residue and volatile products is of the utmost importance. The mechanism of the reactions involved has not yet been explained, but the indications are that the various additions [of inorganic compounds] influence thermal decomposition, so as to bring about scission of the molecules at different points, with the result that not only the relative quantities are affected, but that the properties of the products, and particularly those of the coke, are varied both as regards chemical composition and physical character. Support has been given to the latter contention by more recent work on similar lines, in which the coke obtained was analyzed for its ultimate composition. This is shown to vary very considerably.

It is pointed out by Dr. Lessing that the results indicate that catalysts which increase coke yield also tend to raise the carbon percentage in the coke obtained. A significant and surprising result is that the oxygen contained in the cokes—after making allowance for the possible total of sulphur and nitrogen included in the different values—varies considerably; and this fact has an important bearing on the inflammability, reactivity, and combustibility of coke. Corroborative work on the influence in carbonization of inorganic compounds added to coal or of the composition of its ash has been carried out by other workers; and it is submitted by Dr. Lessing that the fact that such compounds have a decisive effect on the yield, distribution, and properties of the products, both in the primary decomposition of the coal and the secondary changes of the first products, can no longer be doubted.

We believe these lectures which compress so much information on this, economically, highly material subject of ash in coal will have a large influence in the coal industry. In them also is abundant inducement to the carbonizing and other large fuel-using industries to bring their combined weight to bear in insisting that coal shall contain only a fraction of the proportion of mineral matter which is customary to-day. With Dr. Lessing, we fully believe that the provision of such a commodity will be technically possible and commercially profitable, and that it will be of economical advantage to both supplier and user.

The Mechanism of Propaganda.

Just as a machine must possess all its parts to enable it to function, so must every system in any direction of activity possess every essential part for producing maximum effects. This applies to propaganda as to other things. Propaganda requires for the realization of maximum effect a scientifically correct and complete mechanism. In the gas industry we have propaganda mechanism on the right lines, and operating with a high degree of efficiency. Perhaps in places—particularly on the local side—it is capable of improvement; and on the national side the machinery could be raised to higher effective power if the means for doing so were available. In constructing propaganda mechanism for a public utility industry such as gas supply, there are two main complementary courses—national work and local work. The one cannot produce maximum results without the other, and such results cannot be achieved without both are working in unison in respect of efficiency. If one is working with high efficiency and the other is not, even then some good is realized, but not the maximum. The "B.C.G.A." is the part of the propaganda mechanism of the industry which looks after the national publicity, educational work, and the creation of public opinion; and it also operates in the highways and by-ways of influence. Each gas undertaking must complete the mechanism by providing for propaganda in its own area; and, apart from the influence brought to bear upon the work by that of the central organization, there can be obtained, from the resources of that body, much valuable material to render more effective the local efforts. The work that the "B.C.G.A." does cannot be performed by individual undertakings; only co-operative support and collective effort have the needful capacity. But though the influence of the work of the "B.C.G.A." has ubiquity, the organization cannot possibly perform the work which is essentially that of the local section of the propaganda mechanism. If every gas undertaking did its part in making as perfect and effective as possible the complete mechanism, the gas industry would add still more remarkably to the annual reckoning of new business.

These thoughts were raised by reading a paper which Mr. W. M. Mason, the Manager of the "B.C.G.A.," gave last week to the West Riding of Yorkshire Gas Salesmen's Circle, the major part of which contribution we shall be publishing in the next issue of "The Gas Salesman." What Mr. Mason set-out to show was how the work of the central organization helps the gas salesman; and, in doing this, he illustrated the completeness of the propaganda mechanism which the industry possesses if it only operates it nationally and locally to the fullest capacity, and therefore advantage. In considering the work of the mechanism, it must be remembered that results are not to be measured solely by immediate returns in the shape of new business, which first impulse suggests as the line of examination to ascertain effect. That only applies up to a point. Results which are not at once obvious are equally important. The work in its effects is also beneficially reactive; and it is an assurance. We must not forget that the greater the success of the gas industry, the greater the energy of its competitors. The more the competitors search round for what is necessary to build-up those parts of business which are needed for their own larger success, the more will they prosecute work to achieve their purpose. Upon their activities, the work of the gas industry's propaganda mechanism reacts; and the work is therefore defensive, as well as educational. For this reason alone the mechanism can never—must never—cease working; nor must it for the reason that it is an assurance for the future. Immediate productivity is only part of the result; we have continuously to ensure the future stability and progress of our interests. And this the present lines of propaganda are doing, and the known but immeasurable value of those lines will cause them to be pursued unremittingly. It is a good mechanism which, by the nature of its operations, promotes and resists and has prospective advantage.

Mr. Mason made the salesmen whom he was addressing conversant with the aims and scope of the operations of the "B.C.G.A.," so far as it was politic to tell them. It is not always prudent to shout from the housetops all the directions of legitimate propaganda effort and strategy, though it has a strong backing in the definite knowledge that (as Mr. Mason puts it) the industry "holds the solution of many domestic, civic, and national problems." The normal work of the organization is well known. It comprises national and regional advertising—in national papers which are read everywhere, professional and trade papers which are read by men whose influence is of value to the gas industry, and in papers which are of the county class—educational and defensive work, lectures and papers, newspaper articles and news, literature for local distribution, advertising and illustration material, it advises and supplies wanted information, and much else. All this the local work of showroom, salesmen, canvassers, and general publicity carries to completeness. Admittedly propaganda work costs money; so does new plant. Both, however, are profitable. The big emporia find it so. Advertising is the principal item in the programme; and indeed, it is the first duty of the "B.C.G.A." In this relation, Mr. Mason shows how costly it would be for a single gas undertaking to advertise in some of the most popular of newspapers; it can only be done co-operatively. A page in "Punch" each week for a year would cost £10,000; the front page of the "Daily Mail" one day a week for a year would cost £70,000. But it must not be thought that all newspapers have such tariffs. A page advertisement in the "Journal" for a year would cost from 3 to 5 p.ct. of the price mentioned for "Punch," and about ¾ p.ct. of that named for the "Daily Mail." But our clientele, or the greater part, are not the people whose interest and patronage the "B.C.G.A." want to arouse. They are already working for, or financially interested in, gas; and it might not be worth while the organization

spending money to reach the electrical critics of the gas industry who, with more or less shameless interest, peruse our columns week by week to ascertain what degree of luck or otherwise we are having. In this connection, Mr. Mason stated that part of this year's national campaign was devoted to full-page advertisements in five of the leading newspapers; and these cost in round figures £5500. Advertising gas has to be done in both good and bad times. Some people when business is good say there is no occasion to advertise; when it is bad, they declare they cannot afford it. At both periods they are wrong. Maintenance and development of business are the goals of all advertising. Good business is more likely quickly to decline without advertising; and bad business will be slower in coming and of shorter duration by high standard advertising.

From all points of view, the propaganda mechanism of the gas industry not only must be kept in good order, but must be developed as occasion needs. So far it has shown excellent flexibility in adapting itself to requirement; and the gas business—especially during the years of the existence of national propaganda, and the elevation of local propaganda and service—has shown a remarkable responsiveness to the work that has been done. The statistics given in the paper prove this. The secondary products supply the only cloud—just now. If this would pass, with the uncertainty as to the coal position, all would be well. But whatever may be the conditions of the industry at any time, there can be no two opinions as to the mechanism of propaganda being maintained in sound and effective order.

Electricity Commissioners and the Northumberland Clause.

We take it that Parliament expects the Electricity Commissioners to be judicial and absolutely impartial in the exercise of their functions, and not to show any distinct bias towards the electricity industry as opposed to interests outside it, but concerned in it (where the supply is under municipal administration) both as ratepayers and competitors. It is stated in the recently issued annual report of the Commissioners that several interested parties have applied for the Northumberland or similar clause to be inserted in Special Orders. In view of this, the Commissioners sent a questionnaire to those local authorities whose Orders embody such a clause to ascertain their views of its operation. There is something naive about this action. We wonder what reply the Commissioners expected to get from people who resisted the imposition of the clause when originally sought. The answers came back no doubt just about as the Commissioners anticipated. It is stated that in most cases it was found that recourse to the clause had been unnecessary; in others, the clause had been detrimental and restrictive of negotiation with consumers. Why it should have been "detrimental," and why "restrictive of negotiation," is not explained; and we fail to see any reason why the clause should be so, any more than that the Ten Commandments should be ethically detrimental and restrictive. All that the clause aims at is to ensure that commercial principles shall be observed in electricity trading, and that speculative and uncommercial lines shall not be adopted. In only one case was it stated that no difficulty had been found in conforming with the conditions imposed.

Therefore, the Commissioners have decided to disallow the clause in future, unless a very good case is made out for its insertion. It would be interesting to know what the Commissioners would regard as a "very good case." The clause has hitherto been imposed by absolutely disinterested Parliamentary Committees, and obviously on "very good cases." Had they not been persuaded that substantial competing enterprises, which are large ratepayers, were entitled to protection, they would not have passed the Northumberland or similar clauses. The very wording of the statement on the subject by the Electricity Commissioners shows that they have decided to override parliamentary precedent, unless the unknown quantity of their estimate of "a very good case" can be fully met. It seems pretty clear—or rather (let us say) we fear from this—that a "very good case," from the point of view of the Commissioners, will never be made out. Yet the result of the questionnaire indicates that no harm is done in inserting the clause; the wording and intention of the clause show that, where it has been regarded as "detrimental and restrictive of negotiation," it has prevented business being done on unprofitable lines—nothing else.

Gas undertakings are competitors of electricity, and they are among the largest ratepayers in a district—sometimes the largest. This being so, if deficiencies arise through mismanagement or unprofitable trading in connection with electricity undertakings, the gas undertaking has to bear a big share, relatively to other ratepayers, of the deficiency of its own competitor to the detriment of the gas consumers. In the railway wages award of the National Wages Board, reference is made to the competition experienced by the railways from the growth of motor transport. The report declares, with regard to the rates paid in respect of the railways (amounting to upwards of £7,800,000 in 1924), that the companies are "put in a position of assisting to subsidize a formidable and increasing opposition—a state of affairs which ought not to be allowed to continue." The Electricity Commissioners have decided to disallow the Northumberland or similar clause—on what grounds? The clause would never be asked for, other than where the gas-supplying companies fear speculation and unprofitable business, which might result in their being called upon (as many have been) through the rates to subsidize their competitors. The Central Executive Board of the National Gas Council have decided that action shall be taken by the Council with a view to securing the continued insertion of the clause in Electricity Special Orders.

A Week's Gas Increase.

In the paper which Mr. W. M. Mason read last week before the West Riding of Yorkshire Gas Circle (referred to in an editorial article), he stated that the Gas Light and Coke Company made a new record on Friday, Dec. 4, when they sent out no less than 187 million cubic feet of gas. The Company's output for the seven days ended Dec. 6 showed an *increase* of 250 million c.ft., or 28 p.ct., over the corresponding week of the previous year. What happened in London that week will have had proportionate representation in other quarters of the country.

Protecting British Gas Mantles.

By 308 votes to 142, the House of Commons on Wednesday gave second reading to the Safeguarding of Industries (Customs Duties) Bill, which imposes duties on imported gas mantles, cutlery, and gloves.

Railway Reciprocity.

On previous occasions we have called attention to the fact that the railway companies at times appear to overlook that in the gas undertakings of this country they have particularly good customers whose patronage is continuous all the year round, through the carriage of coal, secondary products, plant, and other goods required in the conduct of their business. This being so, it is only natural to look for the utmost reciprocity from the railway companies. We see from the minutes of the Central Executive Board of the National Gas Council that a resolution has been passed by the South Wales District Executive Board regarding increased custom for gas for lighting in connection with the railways. The resolution instructed the Secretary of the District Executive Board to write to Sir Felix J. C. Pole, General Manager of the Great Western Railway Company, to draw his attention to the large amount of traffic given to the Company by the gas industry in South Wales, and to ask that he should bear this in mind when considering lighting schemes for railway stations, sidings, sheds, &c. The resolution also points out that the greater the use of gas, the more traffic would result, not only in respect of coal, but in secondary products, and repair material. It has been decided that the National Gas Council shall bring this matter to the attention of all the railway companies.

Ascent of the Coal Subvention.

Asking for, and obtaining, in Committee of Supply, a vote of £9,000,000 to supplement the original £10,000,000 voted in August for subsidizing the coal industry during the period of inquiry by the Royal Commission, and until the end of next April, the Chancellor of the Exchequer stated that he estimates the cost for the full nine months will be between £20,000,000 and £21,000,000. Of that sum £19,000,000 will fall in the current financial year. Mr. Churchill frankly admits that the figure which now appears likely to be involved is £5,000,000 to £6,000,000 in excess of that for which he hoped on the original information submitted to the Treasury. Another point in his statement is that, up to the end of October, over 90 p.ct. of the money has gone as a direct subvention of wages. The expectation of the Government will be the hope of most people—that from the Royal Commission a definite pronouncement will come as to whether there is anything fundamentally wrong with the coal industry, and whether the Government can provide a remedy. Regarding the position which will have to be faced next May, the Chancellor made a cogent appeal to both sides of the industry to get together and settle their difficulties, and so by mutual forbearance and common sacrifice avert a catastrophe which threatens the prosperity of the whole community.

Railway Wages Award.

The National Wages Board published their award last week in regard to the application of the National Union of Railwaymen for an all-grade increase of wages, and the counter-application of the railway companies for a reduction. It is difficult to see from known facts as to the condition of the railways that the Board could have done aught else than reject the claim for an increase. But there was the possibility of a reduction. This, however, has not come about; and so there is gratification in the knowledge that there is unlikely to be any immediate disturbance of the relations between the companies and their men, which might result in public misfortune. On the main points submitted to them, the Board in their report simply state that they "are not satisfied that, in the present circumstances, a sufficient case has been made out by the railway companies for a reduction in the base and current rates; on the other hand, they are unable to entertain any of the applications made on behalf of the trade unions." They, however, make certain concessions in favour of the railway companies in respect of entrants to the services after the end of next January.

Railways and Road Transport.

In the course of their report, the National Wages Board make reference to the rapid growth of road motor transport which, they say, undoubtedly constitutes a serious menace to the railway industry. The majority of road hauliers are under no legal obligation to provide regular services, and are at large in the matter of the charges they make. They are therefore in a position to select the traffic for which they cater, and to vary their charges to meet the circumstances of each particular case. On the other hand, railway companies are common carriers, and have no such freedom, their charges being subject to statutory restriction. Under existing conditions, road transporters contribute merely a small portion of the cost of providing and maintaining the roads of which they have unrestricted use; and they are not subject to any legislative control similar to that imposed upon the railways. The number of commercial motor vehicles is increasing rapidly, and in consequence the wear and tear upon the roads is greatly increased. The railway companies are called upon to contribute through local and other taxation towards the cost of maintaining roadways. The local rates paid by the companies in 1924 amounted to £7,826,583, or about 19 p.ct. of their net revenue. The unfairness of this position is further emphasized by the fact that the railway companies are not permitted a free use of the roads. They are thus put in a position of assisting to subsidize a formidable and increasing competition—a state of affairs which ought not to be allowed to continue.

"Intermediates for Dyestuffs."—This is the title of a new book written by A. Davidson, B.Sc., A.I.C., and published by Ernest Benn, Ltd., at 36s. net. A review of the volume will appear shortly.

PERSONAL.

At a meeting of the Directors of the Kelso Gas Company, Ltd., last week, Mr. J. G. G. LEADBETTER, W.S., was appointed Secretary, in succession to the late Mr. David W. B. Tait, W.S.

Before leaving to take up the position of Superintendent of the Rochester Works of the Rochester, Chatham, and Gillingham Gas Company, Mr. E. H. WRIGHT was presented by the staff and employees of the Wolverhampton Gas Company with a solid oak bureau bookcase and a copy of "Modern Gas-Works Practice."

FORTHCOMING ENGAGEMENTS.

[*Secretaries of Gas and Kindred Organizations are asked to assist in making this diary of events as complete and useful as possible by sending the earliest intimation of all meetings.*]

Dec. 17.—SOUTHERN ASSOCIATION OF GAS ENGINEERS AND MANAGERS (EASTERN DISTRICT).—Meeting at No. 28, Grosvenor Gardens, S.W. 1, at 2.30.

Dec. 17.—MIDLAND JUNIOR GAS ASSOCIATION.—Meeting at the Council House, Birmingham.

Dec. 18.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute.

Dec. 19.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Meeting at Bradford. Paper by Mr. J. W. Wood, M.Sc., on "Aeration of Burners."

NATIONAL GAS COUNCIL.

Meeting of Central Executive Board.

The Central Executive Board of the National Gas Council met on the 8th inst., at No. 28, Grosvenor Gardens, S.W. 1—Mr. D. MILNE WATSON in the chair.

PARLIAMENTARY.

(a) *Northampton Gas Special Order.*—It was reported that this Order came before the Select Committee of the House of Lords on Nov. 19, the Marquess of Bath being in the chair. The only petitioners in opposition were the Northampton County Council, who were petitioning for the insertion in the Order of a protective clause in their favour. Mr. Tyldesley Jones, K.C., and Mr. Abady appeared for the Northampton Gas Company, and Sir Lynden Macassey, K.C., and Mr. Rowand Harker for the County Council. Apart from an agreed provision on behalf of the Gas Company—viz., to extend the notice to highway authorities to open or break up any street, bridge, &c., from three to fourteen days in regard to mains, but not in respect of service pipes—the case for the Northampton County Council failed.

(b) *Rating and Valuation Bill.*—The special Rating Committee of the conference of Public Utility Associations, to whom this question had been referred, met on Nov. 17, when it was decided to take steps to move an amendment to the above Bill, claiming three-quarters exemption in respect of the general district rate on underground mains, pipes, and cables of any gas, water, or electricity undertaking.

The following statements on behalf of the Government were reported:

(c) *Electricity.*—The Prime Minister stated on Nov. 16, in reply to a question, that examination of this intricate subject had not yet reached such a stage as to enable him to announce the Government's proposals. When pressed as to whether a statement would be made before the House rose at the end of the year, the Prime Minister said that he hoped it might be possible, but that he would not go beyond that at the moment. On Dec. 2 the Prime Minister said that it was not proposed to publish the Weir Report.

(d) *Smoke Abatement.*—Mr. Neville Chamberlain stated in the House that he hoped to introduce a Bill dealing with smoke abatement next session.

(e) *Factories Bill.*—The Home Secretary announced that the Government did not intend to introduce the Factories Bill during the present session, and that the question whether the Bill would be proceeded with next session would be communicated to the House in due course. He indicated also that support for the Bill was not unanimous.

PUBLIC UTILITY ASSOCIATIONS.

A meeting of the Joint Conference took place on Nov. 26, when the following matters were discussed:

(a) *Rating and Valuation Bill.*—The Watching Committee had decided that the Ministry of Health should be requested to receive a deputation in order to impress upon the Minister the necessity of embodying the following three points in the new Bill to be introduced next year:

(1) The establishment of a central rating authority.
(2) The insertion of a formula embodying the "profits" principle of rating.
(3) Three-fourths exemption in respect of the rating of underground mains, pipes, and cables.

(b) *Appointment of Sir James Devonshire as Chairman.*—It was reported that the Joint Conference has appointed Sir James Devonshire to act as Chairman of the Conference for one year.

Huyton and Roby Gas Company *versus* Liverpool Corporation.

During 1923 the Liverpool Corporation employed contractors to lay a water main from their reservoir at Prescot to Liverpool. The line of the main passed through the area of the Gas Company, crossing several of their mains and services. During 1923 and the two following years, a series of fractures took place in the gas pipes. The Gas Company took action against the Corporation, and the Court found that the contractors had been guilty of negligence in failing to provide sufficient support for the gas mains, and in neglecting to fill-up the trenches properly. The Corporation denied liability, and pleaded that they were not liable under the Public Authorities Protection Act, 1893, whereby it is provided that action must be commenced within six months after the act, neglect, or default complained of, or, in case of a continuance of injury or damage, within six months next after the ceasing thereof.

The Court found against the contention of the Liverpool Corporation, who accordingly entered notice of appeal. The appeal was heard by the Court of Appeal (Lords Justices Bankes, Scrutton, and Atkin) on Oct. 24 and 26. The considered judgment was given on Nov. 20, when the Judgment of Mr. Justice Finlay was unanimously affirmed; the appeal being dismissed with costs.

Chemical Regulations, 1922.

In accordance with the decision of the Central Executive Board on Oct. 13, Counsel has been consulted as to how far the Camborne and other gas undertakings similarly placed are in a position to refuse to comply with the Chemical Regulations, 1922, under the Factory and Workshop Act, 1901.

Railways and Gas Lighting.

A resolution was submitted from the South Wales District Executive Board with regard to increasing the use of gas for lighting in connection with railways. The resolution reads as follows:

> That the Secretary write to Sir Felix J. C. Pole, General Manager of the Great Western Railway Company, drawing his attention to the large amount of traffic given to the Railway Company by the gas industry in South Wales, and asking that he should bear this in remembrance when considering lighting schemes for any railway stations, sidings, sheds, &c., on his line; and also to point out to Sir Felix J. C. Pole that the greater the use of gas, the more traffic there would be required to be dealt with by the Railway Company, not only in coal, but in the residual products—namely, coke, tar, sulphate of ammonia—and also in repair material.

It was decided that the Council should call the attention of all the railway companies to this matter.

Ventilation of Gas Appliances.

A letter from the London and Southern District Junior Gas Association, dated Nov. 17, with regard to difficulties in fitting gas-heating appliances in certain new types of houses, owing to inadequate ventilation, was referred to the Gas Safety Committee of the Council.

Education Scheme—Scotland.

It was agreed to adopt the suggestion put forward by Mr. Napier, Secretary to the Scottish District Executive Board, to make it optional for an increased subscription to be paid to the Council by such undertakings in Scotland as were desirous of doing so; the extra amount to be earmarked for technical education in Scotland in connection with the gas industry.

Electricity Commissioners and the "Northumberland" or "Winchester" Clause.

It was recalled that these clauses had been inserted in Electricity Special Orders of local authorities for the purpose of protecting gas undertakings against unfair rate-aided competition by electricity undertakings owned by municipalities. It was stated that the Electricity Commissioners had made inquiry of all local authority undertakings who had a similar clause embodied in their Orders, with a view to ascertaining their practical experience of the operation of the clause. The Electricity Commissioners reported that in the majority of cases the clause had proved unnecessary, as the undertaking had been consistently self-supporting, and in other cases the undertakings intimated that the existence of the clause in their Order had proved detrimental to development and restrictive in negotiating with consumers. The Commissioners had come to the conclusion that representation for the inclusion of the clause, with the onus of disproof upon the local authority, could not be regarded as sufficient justification for allowing the clause; and they had decided to modify the previous practice, and normally to disallow the clause when applied for, unless a good case for its inclusion was made out.

The Central Executive Board decided that action should be taken by the Council with a view to securing the continued insertion of the clause in Electricity Special Orders.

INSTITUTION OF PUBLIC LIGHTING ENGINEERS.

Council Meeting.

At the Council meeting of the Institution, held at Leeds on the termination of the second annual conference, it was unanimously resolved:

> That the members of the Council of the Institution of Public Lighting Engineers desire to place on record their sincere thanks to Mr. S. B. H. Langlands, J.P., the retiring President, for the able manner in which he has carried out the duties of President during his year of office, and at the same time to record their high appreciation of his valuable services at the inauguration of the Institution.

The Council also considered the services the Hon. Secretary had rendered during the past year, and expressed their thanks to him for the same, especially in connection with the work of the annual meeting and conference at Leeds. The President (Mr. C. S. Shapley) presented Mr. Liberty with a cheque on behalf of the Council—not, said the President, that the Council thought this was an equivalent for the services so freely given.

On a proposition by the Vice-President, Mr. R. Davison (Newcastle), seconded by Mr. Colquhoun (Sheffield), it was resolved that Mr. Leon Gaster (Hon. Secretary of the Illuminating Engineering Society, England) be admitted as an hon. member of the Institution.

It was confirmed that the third annual meeting and conference should be held in September, 1926, at Newcastle-upon-Tyne, under the presidency of Mr. R. Davison, Superintendent of Public Lighting of the city.

BRITISH PITCH.

An issue of the "Journal des Charbonnages" was recently forwarded to us anonymously, attention being directed to the following report, dated Oct. 31, on the pitch market.

Translation.

The market situation seems at the moment to favour sellers. In Great Britain, the output from coke-ovens has been very small for some months past; and while that from gas-works is still considerable, the quality of the pitch derived from vertical retort tar is often so defective that in this direction one must count on much wastage. One should therefore only reckon on pitch from coke-ovens and from gas-works carbonizing in horizontal retorts.

In 1924, the output of pitch in Great Britain was lower than that of 1923 by about 50,000 metric tons; and judging by the very few coke-ovens at work during the greater part of the present year, 1925 will without doubt witness a further fall.

In Germany, the output is very much less than before the war, and facilities for export seem to be restricted; hence Italy, which for several years has drawn its supplies chiefly from the Ruhr, has just fixed up fairly important contracts in Great Britain. At present, pitch from the United States is handicapped by costs of transport, and does not find its way to Europe.

As for France, if the output of tar has further increased during the current year, it would appear to have reached its present limit, or very near it. In any case, the use of tar for road dressing is increasing every day; and it is improbable that the output of pitch will grow in proportion to the tar. On the contrary, the consumption of pitch as a glutinant has reached a high level in all countries, and shows a tendency, particularly in Wales, to become more popular for such purposes.

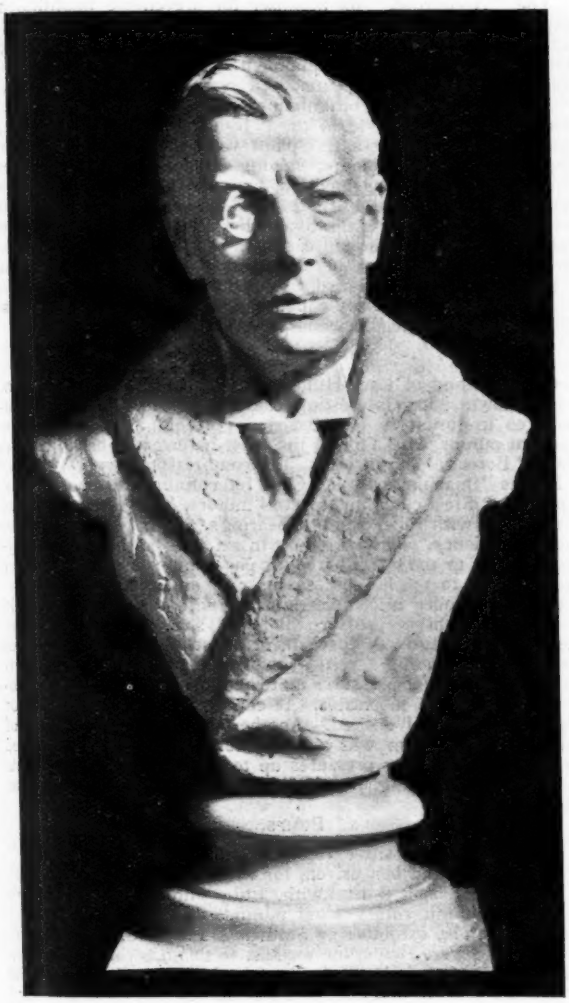
From July to September, 1925, exports of pitch from England reached 30,000 metric tons, as against 11,000 in 1924; the price fetched being about 42s. 6d. f.o.b. usual ports. Unless the present situation is modified, higher prices are possible until the end of March next.

International Gas Exhibition at Antwerp.

Many of our readers doubtless still remember the great success attained by the International Gas Exhibition held in Antwerp in 1913. This industrial display made a tremendous impression; and its effect as a means of propaganda for gas for all purposes was remarkable. Encouraged by this success, a Committee composed of several of the same members as in 1913 have decided to organize at Antwerp in May, 1926, a new exhibition dealing with gas and its various uses. This enterprise, which is under the auspices of the Imperial Continental Gas Association at Antwerp, is receiving encouragement from all sides; and everything points to unprecedented success. We cannot too strongly urge those interested in the gas industry to support this International Gas Exhibition; for it is to the interest of all to take part, in order to bring to the notice of the thousands of visitors from all countries who will inspect the stands their products and the very latest improvements in an industry which is of primary importance in the sphere of human activity. Those desiring information concerning the exhibition should apply to the Secretary's Office, Gas Company, 58, Meir, Antwerp.

MR. JOSEPH CHAMBERLAIN AND THE BIRMINGHAM GAS SUPPLY.

The City of Birmingham Gas Department has accomplished its fifty years of municipal ownership; and to commemorate the jubilee of the Department and the important part played by the late Mr. Joseph Chamberlain, M.P., in the acquisition of the undertaking by the city and its early administration, the Gas Committee decided to place a bust of Mr. Chamberlain in the entrance hall of the head offices of the Department. In connection with the unveiling ceremony, which took place on Dec. 8, an illustrated booklet set forth, in brief, Mr. Chamberlain's part in the negotiations which led to the purchase by the Corporation in 1875 of the two Gas Companies then serving the district. These were the Birmingham and Staffordshire Gas Light Company and the Birmingham Gas Light and Coke Company. Mr. Joseph Chamberlain was at that time Mayor of the Borough, and devoted a vast amount



of time to the project. He gave evidence before the Parliamentary Committee who considered the Bill; and there is reproduced in the booklet a page (in his own handwriting) from the note-book which he utilized in the preparation of this evidence, and during his subsequent Chairmanship of the undertaking. This note-book is now in the possession of the Gas Committee. The compiler of the brochure states that much of the present prosperity of the undertaking is directly attributable to the good foundation which Mr. Chamberlain laid down during his Chairmanship of the Gas Committee. Thus it was considered particularly appropriate, in commemorating the jubilee year of the Department, to commemorate also the close association of the late Mr. Joseph Chamberlain with its early history by the erection of this bust, unveiled by his son, the Right Hon. Arthur Neville Chamberlain, Minister of Health.

At the unveiling ceremony, Alderman J. H. LLOYD, Chairman of the Birmingham Gas Committee, who presided, said that to the influence of the late Mr. Chamberlain could be traced much of the greatness to which the City of Birmingham had risen to-day. However far-seeing Mr. Chamberlain was when he proposed the purchase of the gas undertaking, he could not have imagined the strides which had been made in the Department's development. Its history had been one of continued progress; and to-day the city possessed the largest gas undertaking outside London.

Mr. NEVILLE CHAMBERLAIN then unveiled the bust. He said he was grateful to the Gas Committee for the considerate thought that prompted them to invite him to perform a ceremony which had such a deep interest for him. Those features which had been so skilfully rendered by Mr. Courtenay Pollock, the sculptor, were still familiar to many; but already the majority of those who daily came into that hall never saw his father in real life. Therefore, speaking both as a citizen and as a son, he rejoiced that future citizens of Birmingham would have an opportunity of seeing for themselves what manner of man he was who first conceived the idea of a municipal gas supply for the city, who himself put it into operation, and laid the foundation of its administration. When, after five years, he retired from the chairmanship of the Gas Committee, the Department had made a profit of £230,000, and had handed over £136,000 in relief of the rates. Up to the beginning of the present winter, the highest weekly output of gas in the history of the Department was 334 million c.ft. In the week ended on Saturday Dec. 5, it rose to 362½ millions. And whereas the record day's output registered during the war period was about 56 million c.ft. on Jan. 8, 1918, on Friday, Dec. 4, it rose to 58¼ millions. But there were other developments which were of peculiar interest to a Minister of Health. If they studied the statistics which were every year published by the Department, they would find that the most fatal forms of disease were not tuberculosis or cancer, but those which affected the respiratory system. A couple of days of fog sent up the death-rate immediately, and this was largely due to the fact that the fog held in suspension the particles of unburnt fuel which were continually pouring out of domestic and industrial chimneys. He had undertaken next year to introduce another Smoke Abatement Bill. Industrial chimneys discharged into the air every year 500,000 tons of soot, but there came from domestic chimneys five times that weight. Happily, he had an ally in the Gas Department of Birmingham, who had done an enormous amount of work to clear the atmosphere, by facilitating the use of gas cookers and fires, and by the installation of prepayment meters. There were in use to-day in Birmingham no fewer than 200,000 gas cookers, and 90,000 fires and hot water apparatus. And since, fortunately, in this case the public could not help buying British goods, the orders which were being received in the Department—to the extent of 800 to 1000 a week—were giving employment to British workmen. Splendid work was being done in the Industrial Research Laboratories of the Department; and already it had been of material benefit to manufacturers. He anticipated that in the near future the present Government would be introducing legislation which might have the effect of bringing about a considerable development of electricity. He thought this development would be supplementary to, and not in substitution of, gas. The vast gas undertaking was now so securely based, so scientifically managed, so progressive in its methods, so firmly rooted in the affections of the people, that it had nothing to fear from any other form of energy. In celebrating its jubilee, the Gas Department could not only look back upon fifty years of constant and remarkable progress, but could turn to the future with a complete and well-founded confidence that it was going to be as prosperous and as beneficial to the community as in the past.

The LORD MAYOR proposed, and Sir HALLEWELL ROGERS (a former Chairman of the Gas Committee) seconded, a vote of thanks to Mr. Neville Chamberlain.

After Mr. Chamberlain's reply, the proceedings terminated.

SHIPPING ENGINEERING AND MACHINERY EXHIBITION—Nov. 23 to Dec. 5.

(*Concluded from p.* 664.)

OIL SEPARATION AND PURIFICATION.

The numerous exhibits relating to this subject showed how much interest is being displayed by manufacturers of plant in the solution of various problems. There can be no question that the efficient running of an engine depends to a large extent on the condition of the lubricating oil; and with regard to the oil engine, the purity of the fuel is, of course, all-important. Consequently it is thought that a brief account of some of the stands will be of interest.

THE STREAM-LINE FILTER COMPANY, LTD.

At the Shipping Exhibition held in 1923 this Company had a great deal of interest to show; but the remarkable display at this year's exhibition indicated what enormous advances the firm have made during the past two years, and how they have applied practically the scientific and simple invention which is due to Dr. Hele-Shaw. The principle of the "Stream-Line" filter was dealt with in some detail in the "JOURNAL" for July 18, 1923, so that it is unnecessary to reiterate it here. That the principle is extremely sound technically was stated in the article referred to. That it is also eminently practical was proved by the interesting exhibits this year.

Space alone forbids a detailed description of the stand of this Company. "Do you use your lubricating oil once, and then throw it away?" was one of the questions asked by the firm. There is a "Stream-Line" oil filter measuring only 6 ft. high by 2 ft. wide which, used in conjunction with a simple vacuum pump taking less than ¼ H.P., completely reconditions—by filtering-out the 1 p.ct. of "black"—up to 700 gallons of used lubricating oil daily. The saving estimated by one user who has a larger plant, for the filtration of Diesel engine oil, is over

£2000 per annum. The filter consists of a number of packs of specially-prepared paper washers, between which the oil is passed. The dirty oil flows radially inwards through each cylindrical pack, depositing on the outside the impurities. This is at intervals blown off by compressed air admitted to the centre of the pack, and falls to the bottom of the filter. The Company had a striking test showing the change made in the oil by passing it through the filter. In one beaker was the dirty oil, in another the clean oil. In each was a lighted electric lamp. The filaments of the lamp were invisible through the used engine oil, but could be seen clearly through the filtered oil, which was of perfect colour.

On the same stand was an apparatus for separating oil from water. The finer the degree of separation, the more difficult it is to perform; and it is in the latter stages of treatment that the essential improvements of the "Stream-Line" separator are to be found. A large proportion of the oil is separated in preliminary settling chambers, which are arranged with baffles. The next stage is a new tubular separator. The oily water, which if turbulent retains minute particles of oil mist, is passed down small tubes so as to flow in a tranquil manner. Along the top of these tubes, to which the oil mist rises, is a series of small holes which permit the escape of the oil into the surrounding water. The oil rises to the top and is drawn-off at intervals. The water leaving these tubes is now free from all but the most minute oil particles; and these traces are removed in a special "Stream-Line" filter which is easily cleaned and does not need renewal when dirty. The cleaning is effected by blowing steam through the filter bed.

A laboratory model of the "Stream-Line" filter was shown; and this has many new and interesting features. Its construction and the fine character of its filtration render it a quantitative instrument for analytical research on industrial materials such as paints. The pack pressures and the pressure of filtration may be adjusted and recorded with accuracy, so that a complete control of the operation is obtained. Another new feature is that the outer surface of the pack, where the liquid leaves after filtration, is now exposed, and the flow can be watched. After filtration, the solids collected can be removed without disturbing the pack.

Different types of Sharples "Super-Centrifugal" oil purifiers were exhibited on the stand of Super-Centrifugal Engineers, Ltd., of London. An interesting development shown for the first time was a totally-enclosed purifier, which precludes any possibility of fumes from heavy Diesel engine fuel oils when being treated at high temperatures. The lighter grades of Diesel oils can, of course, be effectively dealt with by the Sharples machine at ordinary temperatures. Specimens of lubricating, fuel, and insulating oils before and after treatment were exhibited, together with analyses and micro-photographs; the whole forming a striking illustration of modern technical methods in oil purification. The exhibit of British Separators, Ltd., of Peckham, consisted of a full range of their "Vickcen" separators. These machines are designed primarily for the purification of fuel, lubricating, and insulating oils, but have numerous other applications, such as the dehydration of tar and the clarification of benzole. A system of straining fuel oils and other fluids without the disadvantages of gauze was demonstrated by Auto-Klean Strainers, Ltd., of London. Other London firms who showed their oil purifiers were Empson Centrifugals, Ltd., and Ferguson & Timpson, Ltd.

BOILER PLANT.

Approximately one-third of the heat of the fuel in an ordinary internal-combustion engine is turned into useful work; the remaining two-thirds being carried away—half by the cooling water, and half by the exhaust gases. Consequently considerable interest attached to the stand of Clarkson Steam Motors, of Westminster, who, among other things, exhibited a boiler designed to utilize a large proportion of the heat which usually goes to waste in the exhaust gases. This boiler consists of two vertical cylindrical shells, one contained within the other; the space between the shells holding the water. The inner shell is provided with thimble-shaped tubes which project inwards from the water space into the path of the hot exhaust gases, and form an effective heating surface. These thimbles are staggered vertically, which causes the gases to impinge on the tube surfaces. A pulsating circulation is set up, which assists in the prevention of deposit; and a baffle-plate situated between the inner and outer shells of the boiler prevents the feed water from impinging on the hot inner shell, and facilitates the separation of any lime contained in the water. Should a supply of steam be required when the engine is not working, arrangements can be made for the boiler to be heated direct by a burner.

A graded draught cellular chain grate, complete with forced-draught equipment, was exhibited by Edward Bennis & Co., Ltd., of Little Hulton. The chain grate is driven by an electric motor through an enclosed gear box giving six different speeds. For the supply of forced draught a self-contained electrically-driven fan is provided. Unlike the usual practice, this fan delivers high-pressure air into a Vena contractor, this current inducing the requisite air supply at a lower pressure. The air flows at an air inlet and damper box, whence it passes into the cells of the chain grate. The chain links are designed to give a large cooling surface, which greatly increases durability in connection with the use of preheated air. Samples of different types of Bennis links were exhibited, including the well-known narrow dowelled link.

Ruston & Hornsby, Ltd., of Lincoln, among other exhibits, showed their "Thermax" vertical boiler, which has a special arrangement of cross tubes whereby the firm claim that great economy in fuel is secured. Babcock & Wilcox, Ltd., had, as usual, an excellent display. This firm are now concentrating on waste-heat boilers, not only for vertical retort settings, but also for horizontal installations. G. Dikkers & Co. (England), Ltd., who specialize in super-pressure boiler mountings and valves for steam-working pressures up to and exceeding 800 lbs., had a representative display of their products; while the exhibit of John Thompson (Wolverhampton), Ltd., included the header of a "John Thompson" horizontal water-tube boiler, a superheater, and a self-supporting steel chimney. Arthur Ross, Hotchkiss & Co., Ltd., demonstrated for the first time a new type (the "Duplex") of "Hotchkiss" circulator. This can be made to operate automatically or by power, and is specially suitable for small tube boilers at high pressures.

MISCELLANEOUS EXHIBITS.

The "Areograph" oil atomizer for preventing naphthalene deposits in mains was shown by the Areograph Company, Ltd., and both this firm and Areosytle, Ltd., showed various types of improved paint-spraying equipment. The Mond Tar By-Products Syndicate, Ltd., made a special feature of their "Melanoid" colloidal bituminous paint—a new product which was recently referred to in the "Journal" (July 22, p. 223). About twenty grades of this paint were shown, including air-drying blacks and colours, stoving grades, and hot enamel. Among the specimens on view was the heat-resisting grade known as "Melanoid Furnace." This variety is designed to withstand temperatures up to 500° Fahr. It is particularly useful on induced draught fan casings, retorts, and similar work. Another grade shown was "Melanoid Heavy Brown"—an acid-resisting paint designed to withstand strong acid solutions, foul water, acid and fatty vapours, &c. The other product exhibited was "Zulite," a wood preservative.

Air Compressors.

On the stand of Lacy-Hulbert & Co., Ltd., of Beddington, were shown many interesting examples of this firm's manufactures in the form of fixed and portable air compressors, vacuum pumps, &c. One of the most noteworthy exhibits was the "Boreas" high-speed air compressor, type "L.V." "Boreas" machines are designed for running at 1000 to 1500 r.p.m., for direct coupling to petrol motors, &c. They are fitted throughout with roller and ball bearings, and have a high volumetric efficiency. They are built in six sizes with output varying from 1½ to 100 c.ft. of free air per minute, and suitable for pressures up to 150 lbs. per sq. in. By an ingenious arrangement the cylinder is completely filled with air at, or slightly above, atmospheric pressure at each stroke of the piston. Reavell & Co., Ltd., of Ipswich, demonstrated several types of compressor, including a vertical two-stage machine, with inter-cooler, designed for pressures up to 120 lbs. per sq. in., and provided with forced lubricator. It can be specially adapted for higher pressures if desired. Another exhibit on the stand of this well-known firm was a rotary compressor, direct coupled to motor, suitable for pressures up to 20 lbs. per sq. in. This machine has a rolling drum, which reduces friction and wear to a minimum.

Pumps.

The "Essex" positive rotary pump, and the "Wonder" rotary, electric and belt driven, for water, petrol, tar, &c., were exhibited by Jobson & Beckwith, Ltd., who also showed their "Norfolk" limit rotary hand pump. Positive-acting rotary pumps were also exhibited by Stothert & Pitt, Ltd., of Bath, on whose stand were two crane models, to demonstrate the essential features of their latest form of horizontal luffing jib crane operated by cranks and connecting rods. No ropes of any kind are employed for luffing, and the jib is pivoted above the machinery house, affording an unobstructed view for the driver. Some characteristics of the system are safety in use, simplicity of mechanism, high efficiency, and an ideal motion for the load.

The Consett Iron Company, Ltd., exhibited a wide range of their silica refractories for gas bench construction. This Company use annually large quantities of refractory materials of their own manufacture, in their iron works, steel works, and coking plants. Thus the brickworks products are being continuously tested in practice, under actual working conditions.

The Becco Engineering and Chemical Company, Ltd., showed their well-known "Becco-Legg" water softeners, fitted with "XL" gear (dry feed system). The special feature of this gear is that all mixing, measuring, and weighing of the reagents by the attendant are dispensed with, and instantaneous adjustment is provided for both lime and soda. This makes the plant eminently suitable for dealing with variable waters, such as river water, or for cases where it is desired to treat two or more supplies with one machine. We will terminate these notes of the 1925 exhibition by referring to the "Hilmor" pipe-bending machine, which was exhibited by C. A. Hunton & Sons, and which will bend light-gauge copper, brass, aluminium, steel conduit, and gas, water, and steam pipe without filling and by unskilled labour.

ELECTRICITY SUPPLY MEMORANDA.

THE fifth annual report of the Electricity Commissioners for the year ended March 31 last has been issued. It covers many topics, which show how far-reaching are the activities of Sir John Snell and his colleagues. One point which attracts attention is that the number of units sold by statutory supply undertakings during 1924 was 4,997,963,253—an increase of 15 p.ct., or about 117 units per head of the population. Not including railway and traction, the sale of energy mentioned is the comparative figure in which the gas industry is concerned. The actual units sold *per capita* would, of course, be increased if private supplies were embraced; but it would not make much difference. The statutory undertakings to which the aggregate sale figure applies number 486; but the returns include 584 stations—constituting 270 local authority ones, 216 company, 49 railway company, 26 tramways, and 22 non-statutory. The whole of these generated an aggregate of 7,415,375,529 units, for which the fuel consumed was: 7,892,396 tons of coal, 95,436 tons of coke breeze, and 54,410 tons of oil fuel. The increase in the units generated by these stations (traction included) was 11 p.ct., while the fuel advanced by 6 p.ct. This shows an improved efficiency. Reverting to the units sold by the statutory supply undertakings—4,997,963,253—the potential heat value of these is 170,530,506 therms. The largest gas undertaking in this country—the Gas Light and Coke Company—last year supplied in gas alone 183,215,068 therms, and, in addition, produced 1,389,980 tons of coke, 237,081 tons of breeze, 20,508,578 gallons of tar (from coal alone), and 597,619 butts of ammoniacal liquor. Yet they did all this by carbonizing 2,192,291 tons of coal, and using 11,784,916 gallons of oil for carburetted water gas. If we add to the public supply sales of current the energy produced for railway and tramway purposes, and throw in the non-statutory undertakings, the 7,415,375,529 units produced from the quantity of fuel already mentioned is only equal to a potential heat value of 253,012,613 therms, which even then is only about double the heat energy sold by the Gas Light and Coke Company—one Metropolitan Company, as against the whole of the electricity generating stations in the country—with less than 28 p.ct. of the coal, and contributing to the markets coke and other products.

Production and Thermal Energy.

The Commissioners and the Northumberland Clause.

Another section of the report leaves us wondering whether the power-sanctioning functions of the Electricity Commissioners compass the interests of the ratepayers—particularly the large ones, one of the most important being the gas undertaking wherever situated. It is stated in the report that several interested parties have applied for the insertion in Special Orders of the Northumberland Clause. In view of this, the Commissioners sent a questionnaire to those local authorities whose Orders embody a clause to ascertain their views of its operation. In most cases, it was found that recourse to the clause has been unnecessary; but in others, it is said, the clause has been detrimental and restrictive of negotiation with consumers. In only one case was it stated that no difficulty had been found in conforming with the conditions imposed. There can be no difficulty unless it be that the clause obstructs—and very properly—electricity supply business being conducted on speculative and uncommercial lines. But the sympathy of the Commissioners has gone out to those concerns who object to being controlled in administering business on legitimate lines rather than to those ratepayers who have to bear through the rates any deficiencies occasioned by mismanagement and uncommercial trading. Therefore, the Commissioners have decided to disallow the clause, unless a very good case is made out for its insertion in a Special Order. The indications are that what other people may regard as a "good case" will not be so considered by the Commissioners. It is surely a "good case" to ask for a clause which will ensure the application of right principles to trading. In fact, the whole of the points made regarding this matter by the Commissioners show that there is greater justification for the insertion of the clause than there is for its omission, because it follows that, if an undertaking is administered as it should be, the clause automatically becomes ineffective. The resistance to the clause, and the remark that it has been detrimental to development and restrictive of negotiation with the consumers, are very significant, inasmuch as all the clause enacts is the application to the electricity business of sound commercial principles. The Electricity Commissioners are obviously of opinion that electricity undertakings should not be fettered to sound principles.

Assisted Wiring at South Shields.

A fortnight ago, we gave some information concerning the adoption by electricity undertakings of assisted wiring schemes as business developers. At South Shields, the electricity concern has done remarkably well in respect of the number of applications that have been received to come under the system; but the whole of the applications—some 9000—are from a class of householder who are for lighting of the lowest consuming order. Loud as the trumpets are being blown now, we shall be surprised if the net result of this class of business is of any real advantage to the undertaking. It involves heavy capital cost, and the maintenance is bound to be of a material order with several thousand prepayment electric meters in use (the reputation of which type is not first class), and the highest percentage of the new consumers represents only three-light ones. Mr. James Edgar, the Engineer, however, thinks it will work out all right, notwithstanding that he is initially going to spend £17,000 on mains, and £18,000 on 6000 services—together £35,000. On the mains and service expenditure, the capital charges will be £2800. The average cost of an installation, including meter, will amount to £7 18s. 0½d., on which the annual interest and sinking fund charges, based on a ten years' life, at 3½ p.ct. sinking fund and 4½ p.ct. interest, amount to £1 0s. 7d. per annum, or in ten years to £10 5s. 10d. We do not see any allowance for maintenance, repair of meters, &c. Monthly collections are going to be made, so that the work of the department must increase. The whole strength of the scheme depends on the factors which Mr. Edgar has taken in his budgeting working-out squarely with anticipations. He estimates that the average number of units that will be consumed will be 123·6 per annum. The largest percentage of the consumers (as already mentioned) are three-light ones; and during the September quarter the average consumption was 17 units, so that Mr. Edgar, optimistically, is of opinion that for a whole year the consumption may be 130 units. The agreement provides that a payment of 2d. per unit (free of meter-rent) in addition to the flat-rate charge—at present, 4½d. per unit—shall continue to be made until a minimum consumption has been registered of 150 units per £1 of capital cost of the wiring installation, after which the additional charge will cease. Should the tenant change his residence, we take it that he will forfeit the whole of the money he has paid towards the cost of installation, and that his successor will, if he wishes to use electricity, benefit from his predecessor's payments. It is thought that the 2d. will be sufficient to meet the capital charges on the wiring and meters. From the first 6000 consumers, based on a full twelve months' working, at an average of 130 units per annum at 4½d. per unit, the calculated income is £14,625. It will be seen from this how much the financial success of Mr. Edgar's scheme rests upon the consumption by these small lighting consumers of 130 units per annum; also upon the good conduct of the prepayment electric meters, which many other engineers with experience look upon with disfavour. It is seen that the local wiring contractors are to do the canvassing, and are to be paid by the Corporation for the installation, at rates which have been mutually agreed upon, after it has been tested and passed. It may be of interest to quote the prices which are to be paid.

	s.	d.	
For a 7-point installation	17	9	per point
" 6 " "	18	0	" "
" 5 " "	18	6	" "
" 4 " "	19	0	" "
For all below a 4-point installation . .	19	6	" "

In addition, 10s. per installation is allowed for supplying and fixing a double-pole ironclad switch and fuses.

It is also seen that the installation includes lighting points, plug, and everything up to lamp-holders; the lamps and shades being provided by the consumers. It may be of interest to give an analysis of the applications up-to-date. The percentages are as follows:

2-light installations	13·5	per cent.
3 " "	26·25	" "
4 " "	15·25	" "
5 " "	22·5	" "
6 " "	22·5	" "

It is observed that in the discussion Mr. R. P. Sloan stated that, at the end of last September, a somewhat similar scheme was put into operation in Newcastle-on-Tyne; and the applications had been at the rate of 1000 per month. As to the use of prepayment electric meters, he prefers not to instal them if it can be avoided, because they debar the use of other appliances, unless another meter and additional wiring are installed. It is hoped that a balance-sheet of the financial results will, after a period of working, be published, in order that scrutiny may be made of the figures to ascertain whether or not this small class of business is of any actual financial advantage to the undertaking.

Defects.

Turning to the assisted wiring scheme at Tynemouth, two points have cropped up which are rather interesting. The first is that the Corporation Electrical Engineer reports that occasionally "considerable" trouble has been experienced by consumers owing to the fact that they have purchased cheap lamps, which take about three times as much current as modern ones. He therefore recommends that, in connection with the assisted wiring scheme, the lamps and shades should (where consumers so desire) be provided by the Electricity De-

partment; the price of installation being increased accordingly. The other point is that, in association with the scheme, it is believed that in certain cases there will be an opening for the sale of current through the slot meters for heating. The Engineer is of opinion that it would not be worth while to put in a second meter for this purpose, and so he suggests that current sold through slot meters for heating purposes, both where assisted wiring is in use and otherwise, should be supplied at half the lighting rate, with only one meter in use for both purposes. In other words, the business should be done by the process of guesswork.

Mishaps. Like gas, electricity has recently had a run of mishaps. Early in the evening of Dec. 4, parts of Brighton were in darkness owing, a local report says, to "the blowing of a main fuse in one of the distributing cables;" and late at night the efforts to remedy matters had not succeeded. On Saturday night, Dec. 5, fire broke out in the basement of a toy and fancy shop at the top of Crown Hill, Croydon, and extended to the neighbouring premises. The fire interfered with the electricity supply, and large portions of the business premises in the neighbourhood were deprived of light—including the Post Office, a cinema, and several licensed houses. While the firemen were engaged in dealing with these fires, there was a call to one which had broken out in the basement of the Prince's Cinema Theatre in North End. News from Cape Town was published in London last Wednesday regarding the wrecking of the Victoria Falls Power Station by an explosion early on the morning of the previous day. The plant is situated on the Vaal River, about 40 miles from Johannesburg. It was built in 1912, generates 58,000 H.P., and supplies about one-fifth of the total electrical energy for working the Rand mines, as well as lighting a number of townships. A report says: "One theory is that the governor gear failed to operate the turbine. The dynamo would then attain a tremendous velocity, which would increase until the centrifugal force became powerful enough to tear the metal asunder. This would result in a terrific explosion, and account for the enormous force which hurled the greater part of the machine, weighing forty-eight tons, through the roof. Some large pieces fell across the river." On Nov. 26, there was a fire at the North Tees power station of the Cleveland and Durham Electric Power Company, Ltd. Oil round the switchgear became ignited, and the heat caused some of the oil-storage tanks to burst. The whole building was soon in flames. The generating station was not damaged; but the switch-house was gutted. Inconvenience was caused to the majority of the large industrial concerns; the supply having to be cut-off as a safeguard. Numerous cables were also burned. A portion of the West Hartlepool tramway and parts of Middlesbrough and the whole of Stockton were affected. The damage is estimated at many thousands of pounds. The Grangetown and other stations of the Company eventually came to the rescue, and afforded a supply. On a recent afternoon, alarm was caused in Northumberland Street, Newcastle, by flames coming from the pavement. It was found that the bitumen insulation of a section of electric cable was burning fiercely. The current had to be cut-off until the trouble had been remedied, which was done the same afternoon. The Broad Oak Print Works, Ltd., were lately fined £10 for a breach of the Factory and Workshops Acts. An electrician's labourer, named Carter, on Oct. 21 was found unconscious in a drying-room, with his neck against a portable electric standard. Although this was of an experimental character, Mr. H. Topham, an Inspector of Factories, submitted that it should have been earthed, or some adequate means should have been taken to prevent its becoming charged with electricity. The wire was bare for about ⅛ in. behind the terminal block.

LOAD FACTORS AND IDLE TIME.*

By Norton H. Humphrys.

This heading might be equally well "First Cost and Earning Capacity," or "Capital Outlay and Gross Revenue." The financial advantages of installing any lay-out of machinery or plant turn on the probability of whole time, half time, or intermittent working, and the effect of the load factor and idle time on the manufacturing costs. The initial outlay, and also the annual charge for interest, repairs, and depreciation allowance are constant to a great extent; but the working hours are subject to variations due to many causes, some of them entirely beyond control. The unit production will be cheaper on a working time schedule of 3000 hours per annum than on one confined to 1000 hours. The greater the first cost and upkeep, the more important does the charge per unit become. With a low price set, it may not be worth consideration; but when the outlay exceeds twice the gross annual receipts, it may determine the difference between success and failure. Fluctuations in market prices, due to war or other conditions, then acquire prominent importance.

Gas engineers who are expected to show as good working on a ratio of capital outlay to annual receipts exceeding 3 : 1 as a neighbour not burdened with more than 2 : 1, or perhaps only 7 : 4, are continually reminded of these facts. The majority of enterprising gas undertakings are now nearer the latter than the former proportion, and therefore the more than doubled cost of outlay that has followed war conditions has passed almost unheeded. It attracts but little attention in connection with the working costs, because the ratio between maximum and minimum output of gas (see No. 4) is not more than about 1½ : 1. At 3 : 1 or 4 : 1, the position would be different.

The 1001 uses to which gas is applied (and which are in all probability nearer 3003) can be divided into three classes. The first is governed by the hours of darkness and their variation at different seasons of the year, having special regard to the customary local hours of domestic closing times; the second turns on atmospheric temperatures; and the third on weekly or monthly variation as caused by business or domestic requirements. The incandescent burner, the gas fire and cooker, engines or industrial appliances, including arrangements of a stand-by character, are familiar examples. The first two are subject, according to season, to a regular variation from a minimum at Midsummer to a maximum at Christmas; the third is of an all-the-year-round character, and therefore the most important from the present point of view. The ideal that admits a minimum cost of production is an equable 8⅓ p.ct. for every month, and is actually secured at some popular seaside resorts. Under such conditions, idle time is unknown. The increasing predominance of the third, as compared with the others, has enabled gas undertakings to offer constant employment, and to increase the minimum to a degree that barely leaves convenient time for an all-round annual repair and clean up.

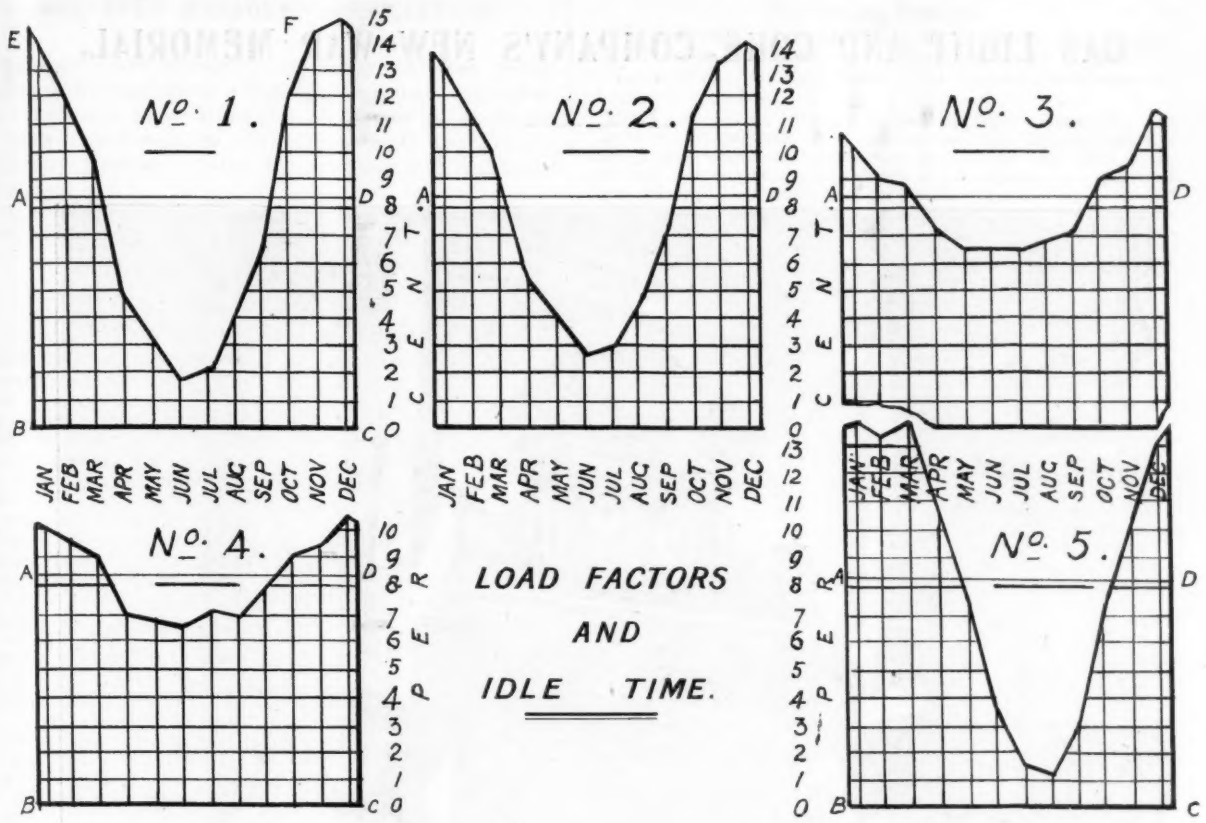
The attainment of this desirable condition has been assisted by moderate differential prices, which offer inducement to prospects of the third class; and are sometimes extended to large factory users for lighting, gas fires, and other lines that do nothing towards either lifting the minimum or flattening the maximum curve. A factory that confines its demand to the short time between dusk and an early closing hour may take a large quantity of gas, but does not help the idle time. The increased use of basement daylight and of all-night lighting, also general later domestic retiring hours, have done more in this direction.

There was a time—and that within the memory of elderly gas engineers—when the use of gas for the first line only was confined to the well-to-do class, and generally regarded as too costly for extended application to any other purpose (at that time, a proposal to fry fish and chips over a gas burner would have been considered impracticable); when the ratio between maximum and minimum was 3 : 1 or 4 : 1, or even more; when retort-house hands and yard labourers were taken on in batches during the autumn and early winter and paid off for the summer in like order in the course of the following spring; when half the plant, from retorts to the consumers' meters, was idle or on short time for six or eight months out of the twelve; when occasional trouble with slacked-off retorts or light charges, holders blowing, &c., could not be avoided. While there was difficulty in finding adequate employment for the reduced summer staff, December and January were anxious months; and if Christmas happened to fall on Sunday or Monday, the maintenance of a sufficient supply of gas during the preceding week was a large order. The difficulties were enhanced by not only monthly or weekly, but also hourly fluctuating consumption. The modern gas engineer regards the demand for gas as fairly constant during eighteen hours out of the twenty-four, and the only slack time as the six hours following midnight. Formerly things were the other way about, and the busy time was for the most part confined to six hours preceding midnight. During the summer the storage was on the increase for eighteen hours at a stretch, and in winter it was difficult to start the long evenings with holders full without occasionally over-shooting the mark and letting gas blow away. Now the variation as between one hour and another is not more than 20 p.ct. or so of the 24-hour output.

So many of the numerous uses for gas are indistinct in character, and there is so much overlap, that a definite division into the three classes above indicated is scarcely possible in a populous or extensive district. There is now no "summer and winter" or "day and night" distinctive consumption. Lighting is by no means limited to the evening hours, or power and industrial uses to daylight. Yet in a small district comprising less than 1000 consumers the few exceptional cases are known and can be allowed for, and approximate estimates can be made. Some inside knowledge of the district concerned is required.

A recent innovation is the alteration in the hour of sunset during the summer six months, so far as the clock is concerned, which at first sight might be expected substantially to shorten the evening lighting periods. A point was made by the promoters of this scheme that one advantage would be a

* This article had been accepted and set in type prior to the publication of Mr. Townsend's paper, "The Daily Graphs," before the London Juniors.



saving in the cost of artificial light. In practice, however, I have not heard of any economy to the consumers or loss to the gas companies, nor detected evidence of such on graphs similar to those given above. The householder does not care to shut up for the night before darkness has entirely set in, or immediately on returning from outdoor recreation that has been prolonged to the last moment. The evening consumption is about the same as before, but an hour later.

The increase in evening amusements, the cinema, public park and band, &c., are also responsible for later hours, and for light suppers easily prepared on the gas-cooker, in place of time honoured, but not tempting, bread and cheese. Fifty years ago, the works governor pressure was reduced at 10 p.m., and the demand for gas fell off rapidly after that hour. Now it extends well on towards midnight.

Load factor and idle time can be presented in graphic form. The following examples are confined to months as being a simple form for illustration; but their extension to weeks, days, or hours will furnish useful information. One scale (say) $\frac{1}{4}$ in. perpendicularly for each time period, and the same horizontally for each unit per cent. of the total output, usually but not necessarily for the year, should be adopted; and a tracing for any selected period, placed over that for a previous year, affords as much idea of progress forward or backward as a long column of figures. The examples are confined to percentages; but 1000 c.ft., therms, or any other standard can be used with equal facility. In all cases some correction or allowance for local conditions is desirable. The average lighting-up hour does not follow sunset in fixed proportion, but varies according to altitudes, height of buildings, width of thoroughfares, extent of foliage, local custom, and many other factors. The hours adopted, however, have proved approximately accurate for small residential towns in the south-west.

The graphs shown above are all on the same basis, and to some extent self-explanatory. No. 1 shows the curve for hours between one hour after sunset and 11 p.m.; the consumption of gas being taken as following the same proportions. In practice, the extra hours already named, and the short and intermittent lighting of shops, public halls, places of worship, &c., tend to offset each other. The monthly consumption ranges from 1·9 p.ct. in June to 15 p.ct. in December, and the ratio between maximum and minimum is 8 : 1. The irregular figure EBCF shows the total consumption, and in all the graphs is equal to the rectangle ABCD, which shows equal instalments of $8\frac{1}{3}$ p.ct. per month.

The capabilities of any particular gas manufacturing, purifying, storing, and distributing plant are commonly expressed in terms of million c.ft. per annum. But the whole must be equal, not to the average $8\frac{1}{3}$ p.ct. only, but to the maximum December requirement, which may happen to show an advance of more than 50 p.ct. The usual practice of allowing a margin for future increase has tended to obscure this fact. Given an equal output of $8\frac{1}{3}$ million c.ft. per month, a lay-out equal to that capacity would suffice; but in the extreme case instanced in No. 1 it should be nearly twice as large, in order to deal satisfactorily with a similar annual amount. Much trouble and loss of business were common in the early days due to sailing close to the wind and trusting to luck for tiding the peak load.

No. 1 applies to very early times, as even in the sixties the consumption was more like No. 2, which is obtained by adding to No. 1 an all-the-year-round equal consumption amounting to one-sixth of the whole. Here the ratio between maximum and minimum is 5 : 1, about 1 p.ct. being lifted off each extreme. Subsequently there has been a steady movement towards the modern conditions represented by Nos. 3 and 4. No. 3 shows a recent year's work on a small undertaking selling gas at a moderate price, but not employing an outside staff or giving attention to the consumer's requirements or development of new business. The large increase of the minimum has been secured by supplying cookers on hire terms. The summer demand is increased to $6\frac{1}{2}$ p.ct. and the winter reduced to $11\frac{1}{2}$ p.ct., giving a ratio of 9 : 5. No. 4 practically represents three undertakings which have adopted modern methods, established showrooms, and secured the bulk of the gasfitting business in their respective districts. The ratio is reduced nearly to 3 : 2. On a similar output of gas, the conditions of No. 1 require a capacity of 50 p.ct. all round as compared with No. 4, apart from the economies due to a more even spreading of the working conditions.

Another way of indicating idle time is dividing the annual make by the maximum percentage, and thus getting at the number of full-speed days required to furnish it.

No. 1. $100 \div 15 = 6\frac{2}{3}$. As $10 : 6\frac{2}{3} :: 12 : 8$ months.
$12 - 8 = 4$ months' idle time.

Following the same procedure we get $8\frac{3}{4}$ and $3\frac{1}{4}$ for No. 2, 10 and 2 for No. 3, and 11 and 1 for No. 4.

Much has been said from time to time about supply of a cheap gas for fuel purposes, and No. 5 has therefore been appended. It is based on the assumption that the demand for this line would bear proportion to the average monthly temperatures deducted from 60° Fahr. The result is a graph that shows wider range than even No. 1, but with the redeeming features of a steady demand during the first three months of the year (which would be discounted by the variations that are experienced at that season) and a wider range of hourly consumption. The ratio between maximum and minimum is about 12 : 1. The production of "cheap" gas under such conditions is a problem for the modern gas engineer; but with evidence of progress towards a low ratio already accomplished, there is every probability that demands coming under the third class would strengthen the position. They would be a necessary on any cheap-gas platform, and the "1001 uses" so helpful in the past, would supply powerful assistance.

GAS LIGHT AND COKE COMPANY'S NEW WAR MEMORIAL.

UNVEILING AT HORSEFERRY ROAD.

Consequent upon recent structural alterations at the head office of the Gas Light and Coke Company, in Horseferry Road, Westminster, the war memorial which was dedicated on Nov. 11, 1921, to those of the Company's employees who lost their lives in the great war had to be replaced by one more in keeping with the new surroundings. The noble design of this new war memorial will be seen from the photograph above, which we are permitted to reproduce from the Company's "Co-Partners' Magazine." The ceremonial dedication and unveiling took place on Armistice Day, before a large and representative assembly; the service being conducted by the Rev. A. E. Cornibeer, of St. Matthew's, Westminster. Immediately on the stroke of eleven, Mr. D. Milne Watson (the Governor) unveiled the memorial, by withdrawing the flags which had screened it. Many beautiful wreaths were afterwards placed at its foot.

COKE OVEN MANAGERS' ASSOCIATION.

The Coke Oven Managers' Association held their annual meeting in Birmingham on Thursday, Nov. 27; and in the evening there was a dinner at the Queen's Hotel. On Friday the members of the Association paid a visit to the Witton Works of the General Electric Company, Ltd., and they were entertained at luncheon.

The chief item at the meeting was the Presidential Address of Mr. PHILIP B. NICHOLSON, J.P., of West Pelton.

PRESIDENTIAL ADDRESS.

[Extracted.]

Your Association has already done much splendid work. Before its formation, ten years ago, no means existed for the interchange of our ideas. Few coke-oven managers even knew each other, and no opportunities were presented for visiting works other than those under one's own supervision. In fact, the whole industry appeared enveloped in secrecy. This was not good for us. It was not good for the industry. It was not good for the country our industry serves. And if this Association could lay claim to no other work than that of dispersing an unhealthy smoke screen, as I might term it, by bringing into operation the wholesome play of fresh air, so essential for all forms of vigorous growth, we should be able to claim that its inauguration had been fully justified.

We have been encouraged by the deep interest taken in the scientific aspects of our problems by professors from our Universities. Having regard to the wide area of representation, involving membership of a scattered character, our own educational scheme, formulated seven years ago, has had, it must be admitted, some measure of success.

Let me remind members of this Association that they are responsible for the carbonization of more than half the quantity of coal subjected to the process in this country—51·4 p.ct.—and that during the last ten years there has been a notable decline in the prejudice against coke oven gas entertained by gas engineers. Their demands upon our resources in the interests of the public authorities they represent are increasing yearly. The economic appeal of our product is proving irresistible.

May I be permitted to urge the great business virtue of adaptability? Behind that smoke screen of secrecy to which I have referred, it must be admitted, there were many shining exemplifications of this virtue, effected in the national interest at a time of great crisis in the life of our State. The virtue is scarcely less needed in these days of peace. The rectification of benzole, the distillation of tar, the manufacture of liquid ammonia—these and other processes have revealed our possession of it, and I am sure it will be fostered. The ability to adapt oneself to circumstances, not reluctantly, but keenly and rapidly, on the advent of new discoveries and obviously improved methods of working may make all the difference between failure and success.

In this connection you will agree with me, I am sure, when I say, with reference to low-temperature carbonization, that this Association will examine with interest and without prejudice any process for making domestic fuel, from whatever quarter it may come. The disappearance of the smoke evil, the bane of industrial areas, would inevitably involve the disappearance of much household drudgery.

Perhaps the most notable event associated with the carbonization of coal was the formation of the Fuel Research Board in 1917. Its chief work has been seen in relation to the gas industry and low-temperature carbonization; and the members of this Association will welcome a programme of activity which includes carbonization in coke ovens and the preparation of fuel for the process. I consider that methods of dry coal cleaning are worthy of serious thought.

Looking into the future, I see the gas engineers, the coke oven managers, and others interested in the production of a fuel by low-temperature carbonization recognizing more than they do to-day the close alliance of their interests. The alliance exists. I believe the recognition of the fact will come, and that in the days ahead there will be a combination of all institutions and associations interested in the carbonization of coal. Until those days, the Coke Oven Managers' Association must continue to play its important part in the industrial life of the nation, and every member must share the responsibility.

I would add but one other word. Let us not forget the human factor. We must have the best workman; and the best workman is the one who feels that those in whose service he is engaged are interested in him as a man, and not as a mere machine. He reciprocates the interest, evident in his work. More than one workman, performing his duties apathetically, has cost his employers dearly through his inattention. More than one, concentrating on the task before him, has contributed to the development of industry by a bright invention. In days when so much is heard of labour troubles, and fears are entertained by some respecting the proposed formation of "one big union," ruled by extremists, it is as well to remember that there is one thing more potent than the biggest union man can ever form. It is the touch of nature which makes the world akin.

THE DINNER SPEECHES.

Mr. Nicholson occupied the chair at the dinner, and supporting him were representatives of the Corporation of Birmingham, the University, the Chamber of Commerce, and members of kindred societies.

Mr. T. B. SMITH, F.C.S., proposed the toast "The City and Trades of Birmingham." He pointed out that Birmingham was among the pioneers of blast-furnace practice as they knew it to-day; and the city was the only one in the country in which coke ovens were built to supply gas for the inhabitants.

Dr. A. H. RAILING (General Manager of the General Electric Co., Ltd., Witton Works), in reply, observed that Birmingham was remarkable for the great diversity of its trades; and one excellent result was that in times of depression unemployment was much less severe than in places where there were only one or two staple trades. The coke oven industry was playing an important part in the industries of the country, for it had long been obvious that the future of British trade must necessarily depend upon the most advantageous use of coal. Unless its energy was transmitted into the cheapest and most efficient form, British manufacturers could not possibly compete with overseas competitors. And what was of greater advantage in that direction than the use of coke ovens? There was excellent inter-working in Birmingham between the municipal leaders and industrial captains.

Councillor PARKES (President of the Birmingham Chamber of Commerce), in the absence, through ill-health, of Mr. W. J. U. Woolcock (President of the Society of Chemical Industry), submitted the toast "The Coke Oven Managers' Association." He remarked that representatives of the coke oven industry would shortly be giving evidence before the Coal Commission; and his comment was that the salvation of their trade and the iron trade depended upon a proper settlement of the coal question. The iron and steel industries and the coke oven trade were inter-dependent. He thought their Association was unique in the fact that its membership represented 90 p.ct. of those engaged in the industry. Such associations were rendering first-class service to the country, in restoring its trade; and the particular industry also benefited by the free interchange of information among the members.

Coke-Oven Managers at the Witton Works of the General Electric Company.

The PRESIDENT, responding, pointed out that a large proportion of the fuel that was carbonized in this country was carbonized by members of their Association. If they listened to some of the statements that were made, they would imagine that fuel economy in the country was not considered by those responsible. The attitude of owners of coke ovens during the past four or five years supplied the most effective answer. If they had not been interested in this question of fuel economy, would they have brought their works up to a high state of efficiency, and would they have sent so many of their members to the Continent and the United States to study the most modern and scientific methods of production? He would like to draw their attention to the question of low-temperature carbonization. In the last seven years reports had appeared in the Press about wonderful experiments having been carried out at Barnsley. Arrangements were made on three occasions for visits to be paid to the works; but each time, a fortnight before the date fixed, the proposed visits were cancelled. It was strange, indeed, that these people—if they were studying the question of low-temperature carbonization—were not able to allow a body like theirs to inspect their works. They welcomed Capt. J. Fraser Shaw of the Fuel Research Station. It was a matter for satisfaction that the Fuel Research Board were prepared to examine without prejudice any scheme brought forward. They would welcome the opportunity of utilizing coke-oven plants for producing solid smokeless fuel.

Prof. T. TURNER, Dean of the Faculty of Science at the University of Birmingham, and Head of the Metallurgical Department, replying to the toast of "The Universities" (which was proposed by Mr. C. P. FINN, of Rotherham, who mentioned that the Association had made a grant towards the appeal of the Leeds University, with particular regard to its Fuel Department), recalled the time when there was a considerable coke industry in South Staffordshire. One had seen on the Continent wonderful plants in which coke of excellent quality was produced, and waste gases were utilized. It was obvious that a great deal of fundamental scientific knowledge was necessary. With regard to refractories, much progress had

been made, and they now knew the conditions under which the retorts could be made with better thermal conductivity, with better insulation, if this was required, and with less chance of fracture. The question of the ash in coke was one of great importance. The Association's grant would be welcomed by the Leeds University, which had long been known for its Fuel Department. They would be interested to know that at Birmingham the new buildings of the Oil Mining and Engineering Department would shortly be inaugurated. It would deal not only with questions arising in the oilfields, but with those concerning oils obtained from fuel carbonization. In the Coal Mining Department another building had been erected, and yet another was to be built. An amount of £10,000 was being spent in the provision of machinery and apparatus. In connection with this Department, which was under the control of Prof. Moss, a great deal of assistance had been rendered by the industries concerned. The installation would include crushing, sizing, and washing plant, and boiler equipment. The whole of the work would be conducted for research purposes.

Mr. A. H. Middleton proposed "Allied Industries;" and Mr. James Smith, in reply, mentioned that Russia was now giving close attention to the coke oven industry, and a good deal of equipment was being sent to that country.

CENTRIFUGAL GAS EXHAUSTERS AND BOOSTERS.

Their Construction and Operation.

The motor or turbine driven centrifugal gas exhauster or booster possesses a mechanical feature of great practical advantage—*i.e.*, fine clearances between the moving and stationary parts are not required. Since wear caused by rubbing of the parts cannot occur, the high initial efficiency of the machine is retained indefinitely. The adverse conditions under which exhausters and boosters are required to operate present no obstacle to the good working of the centrifugal machine. Impurities in the gas, unless corrosive, have no deleterious effect upon the running or on the life of the unit. Not only are stoppages due to clogging with tar or other products unknown, but, as demonstrated in the operation of coke-oven plants, the centrifugal exhauster acts as a tar extractor. The tar is evacuated through suitable drains in the exhauster, and the usual appliance for its extraction can be dispensed with.

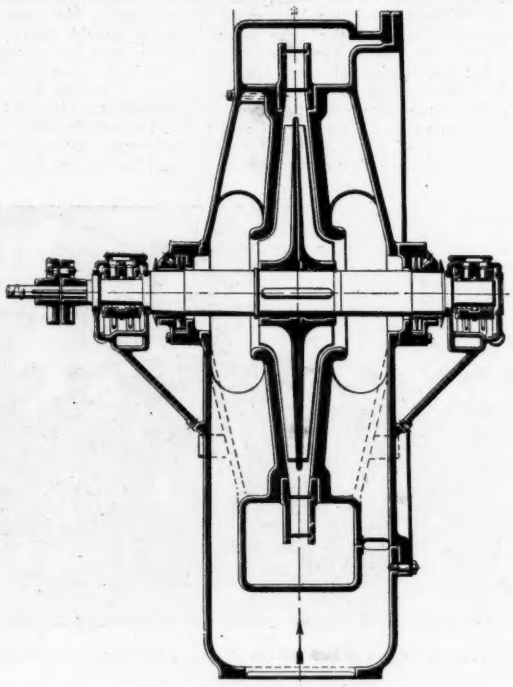


Fig. 1.—Single-Stage Machine.

Other Advantageous Features.

The oil for lubricating the centrifugal machine is only used on the bearings; and as it does not come into contact with the gas at any time, it does not deteriorate. The centrifugal unit permits great economy in the amount of oil used; and the saving in this direction alone can easily amount to as much as £250 per annum.

The floor space occupied by a "B.T.H." centrifugal turbo-exhauster is considerably less than that required for an engine-driven reciprocating exhauster; and consequently the foundations for the former machine are correspondingly small.

A gas suction and compression unit requires certain characteristics for maximum economy and efficiency, and the best results will be obtained by the machine which has inherent features most suitable to the prevailing conditions. The operating characteristics of the turbo-exhauster have had a decided influence on its successful application to the manufacture of coal gas. The practically constant suction which it maintains while delivering any volume within its capacity is an inherent feature capable of being improved still further, and made absolutely positive, by the addition of a simple form of constant-suction regulator. Fitted with a regulator of this type, such a machine will maintain a constant vacuum at the retorts guaranteed to within 0·05 in. W.G., if the gas does not vary more than 10 p.ct. in volume or 15 p.ct. in pressure for a given setting of the suction regulator.

In cases where an electric supply is available, the use of either a D.C. or an A.C. motor, instead of a turbine, for driving the exhauster or booster may be preferred; the motor being of the constant or the variable speed type. In the former case, regulation is obtained by means of a by-pass governor which maintains the desired conditions automatically without any variation of speed. In the latter case, regulation is effected by varying the speed of the motor. The motor is either coupled

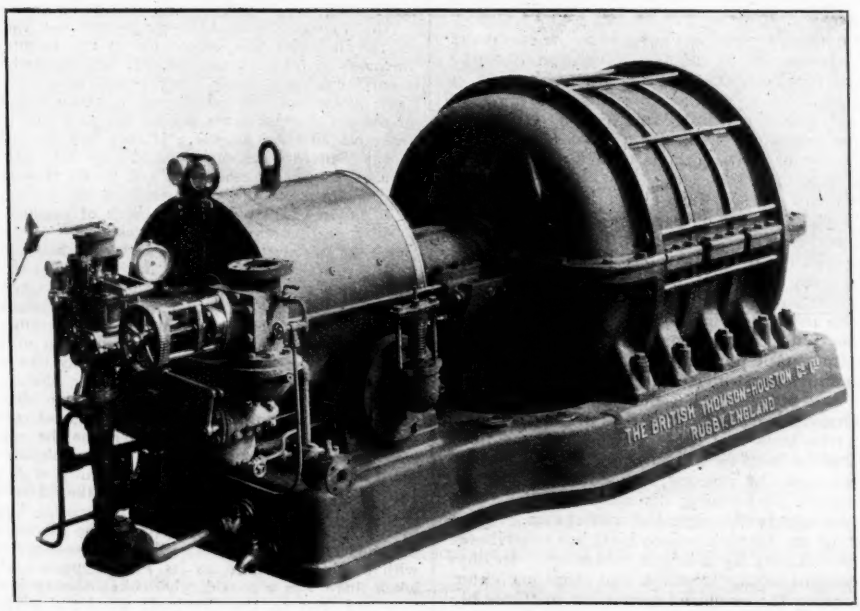


FIG. 2.—A "B.T.H." TURBO-DRIVEN EXHAUSTER OF 300,000 C.FT. PER HOUR NORMAL CAPACITY, OPERATING AT THE WORKS OF A LONDON GAS COMPANY.

direct to the exhauster or arranged to drive through increasing gears.

CONSTRUCTION OF A SINGLE-STAGE MACHINE.

The construction of a single-stage machine is shown in fig. 1. The casing consists of an inner and an outer shell, suitably divided so as to facilitate internal machining. Of the two castings comprising the casing, one forms the removable end cover, while the other is the major portion of the casing; and the two sides of the inner shell are cast as integral parts respectively of these two castings.

The impeller, which is of cast steel, has blades of the double inlet axial flow type, which render unnecessary the use of any devices for the compensation of end thrust. Both series of impeller blades are cast separately with a centre plate and boss. The gas, after leaving the impeller, passes through the diffuser, which consists of steel vanes of suitable design. In the nozzle, formed by the vanes and retaining walls, the kinetic energy of the fluid is transformed into pressure energy, and the gas is then led to the outlet by way of passages formed in the casing.

CRITICAL SPEEDS OF SHAFTS.

Gas exhausters and boosters of the centrifugal type are designed to operate at speeds ranging from 2750 to 6500 r.p.m.; and to introduce a shaft the critical speed of which is above the normal running speed would militate against a normal design, because of the excessive size which would be necessary. The critical speed, as is well known, is that at which vibration due to the elasticity of the shaft reaches its maximum. As the speed increases above this point, the vibrations diminish and then cease altogether. Special consideration has been given to this point; and by designing the shaft with a critical speed of about one-half of the normal running speed, and fitting a special slip bearing, the function of which is to enable the critical speed to be run through without danger of vibration, a light machine, steady and reliable in operation, and economical in first cost and upkeep, is rendered possible.

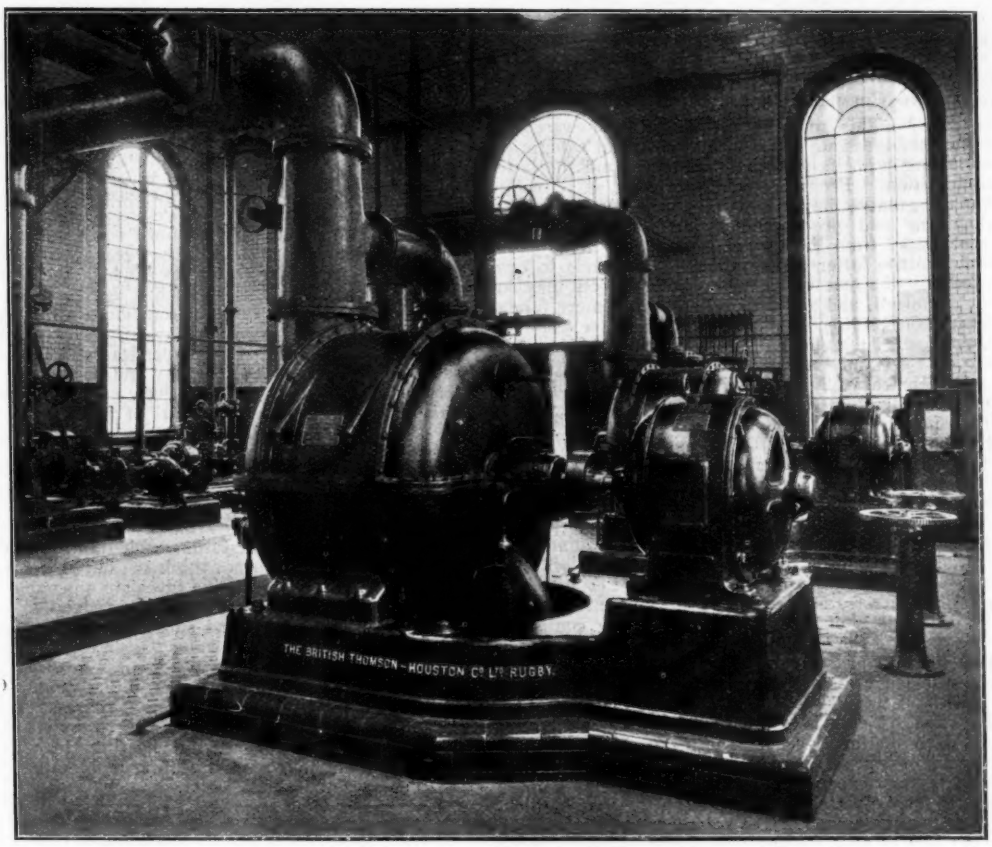


FIG. 3.—TWO "B.T.H." MOTOR-DRIVEN GAS EXHAUSTERS IN OPERATION.

SMOKELESS SOLID FUEL CONFERENCE.

W. EVERARD DAVIES.

Perhaps you will, since I was prevented from attending the above conference, allow me to offer some comments upon the matters discussed, which are of vital importance to the coke and semi-coke producing industries.

COAL-ASH CONTENT.

As remarked by Mr. Leech, the gas industry is in the habit of purchasing coals of either screened or run-of-mine varieties, when the ash content is invariably over 5 p.ct., and usually between 8 and 12 p.ct. While this is decided by considerations of quality suitable for retorting, and by lack of space for washery operations at the gas-works, surely gas companies could utilize the blending advantages, and incorporate with these coals washed slacks, treated presumably at the colliery, so as to avoid unnecessary transport of ash. This would effect two important advantages: (*a*) An improved coke, and (*b*) cheaper coal, at a discount of some 15s. per ton for the slack proportion, which would (say) average 50 p.ct., so as to realize a net saving of (say) 7s. 6d. per ton of coal carbonized. Further, an ash content of (say) 7 p.ct. on the average could be realized, keeping the coke ash below 10 to 12 p.ct.

BLENDING.

For horizontal retort practice, where rapid heat penetration takes place, this method should certainly prove more widely effective and satisfactory, although, for present continuous retorts, admittedly Mr. Leech's observation would hold so long as the rate of heating is low, as is generally the case, and the slack added limited to small proportions with strongly caking coals. Herein, I may add, my system is an exception, in so far as the heating rate is multiplied several times, and so blending is widely amenable. Beyond this point ash prescription seems inadmissible, except as a guide to purchasing on thermal values, as recently emphasized by Dr. Carpenter and others.

I would suggest that a suitable *critical* condition should be arranged as a standard for blending around 100 mm. w.g. plastic resistance, as determined in the Foxwell apparatus, and that the proportions of each coal required to realize this should be the preliminary deciding factor or guide to any such operations. This should then be related to standard sizing conditions in relation to the rate of heating, all of which factors—sizing, plastic nature of coals, rate of heating, and blends of coals used—are intimately bound up with each other. A suitable apparatus for making tests of this kind has been proposed by the writer.

PLASTICITY AND COKING.

While an excess of binder generates a plastic resistance which is too high for ready and easy passage of the gases inwardly, it should not be considered that it is always, and altogether, desirable to eliminate the plastic stage and to effect coke formation without some slight development of this phenomenon. In the first place, the plastic stage is not wholly due to the so-called γ compounds of the coal, but to the accumulation of tar due to γ, β, and α compounds in something like the order named when a coal is strongly caking. In moderately coking coals the β compounds may play a part almost as important as the more stable, and not so readily volatilized, γ compounds responsible

for swelling of the charge. With highly oxygenated feebly-caking or non-caking coals, which are made to coke by a rapid heat penetration, the coking is as much due to tarry ingredients derived from the β and α compounds as from the γ compounds. It will therefore be seen that plasticity is more dependent upon the amount of primary tar of a high thermal stability present than upon the available γ compounds, except that the γ compounds so function under all heating rates, whereas the β and α tars only operate under high heating rates, when their oxygen is, as regards that held by the β compounds, selectively and more rapidly expelled as gases, and as regards the α compounds more attached to the liquid distillates therefrom—the gaseous residual amount being also more speedily liberated at lower temperatures.

It will therefore be seen that the effects of blending *per se* are more pronounced in their improvement of the coke qualities as the rate of heating is lowered, but that, due to other causes, the coke qualities can be still further and largely independently improved by rapid heating. These truths are most important, in so far as they render blending independent of very fine grinding for the production of a good, compact, and readily combustible coke, thereby lowering the cost of coal preparation and raising the throughput. The preferred sizing is an irregular mixture of small and larger particles.

PHYSICAL AND CHEMICAL CHARACTERISTICS OF COKE.

What is coke? This may be provisionally answered by dividing coke attributes into physical and chemical categories. the former dealing with its state and structure, and the latter with its composition. From present knowledge, it is readily realized that the greatest improvements which may be secured from carbonizing and pre-treatment factors will alone be seriously contributed from the former source, but that in producing semi-coke the latter aspect may also be made to contribute something of great value, while both aspects may ingeniously be combined, and an all-round and much more fundamental improvement realized thereby. It is the writer's opinion that in this connection the whole of the domestic smokeless fuel demand can most certainly be immediately satisfied, both commercially and technically, by the production of a volatile coke produced at a high rate of heating up to a maximum charge temperature around 800° to 900° C.

Physically the factors are: (1) Thickness of cell wall, (2) cell size, (3) size and proportions of cells above and below the mean size, (4) amount of open or closed cells and the size of cells mostly open, (5) hardness, and (6) ash content and its composition. Chemically, the factors are: (1) Nature of coal used, (2) maximum temperature attained in carbonization, (3) rate of heating, (4) mode of off-take, (5) steaming, and (6) volatile matter content. Let us, first, take the physical factors, and review their influences. The thickness of cell wall is doubtless related to the γ compound content of the coal and the amount of secondary decompositions as effected by the outward travel of the gases. Consequently, a reasonable sufficiency of γ compounds realizes a sufficiently strong wall without unduly adding to it, as in the case of an excess. The size of cell is likewise bound up with this factor, particularly the larger cells. The mean size of cell may therefore be said to depend upon the γ compound content and the expansion thereby experienced, so long as the carbonized volatiles have to force a path of outlet through the charge thickness. By assisting the escape of the volatiles, expansion is reduced and the size of cells formed diminished. The varying size of the cells is, in the main, a function of the proportions of tarry volatiles of different thermal stabilities. The proportion of the open cells is a function of the gas pressure at the time, and just previously thereto, of rigid formation of the cells, subject to a slight amount of clogging due to secondary decomposition of outward-travelling tar vapours. Hardness is due to the character of the coal carbonized, the ash content, the temperature attained, and the rate of heating. An iron oxide ash doubtless acts catalytically as a carrier of oxygen to the carbon.

Chemically, the important modifying influences are (2), (3), (4), and (5) above; (1) being radical unless blended, the influence of which has been given. The temperature attained governs the volatile content of the coke and its hardness and sizing or fracture. The writer inclines to the upper limit of 900° C. and lower, if domestic purposes require to be served, as the ideal limit in so far as coke properties alone are involved. This would allow at least some 3 to 5 p.ct. of residual volatile matter, as a mean value, to remain. An extreme measure of uniformity in the volatile content of the product is not considered expedient or necessary, especially under rapid carbonization, where the other qualities of the coke vary less as between the wall and the centre of the charge than is otherwise the case. Rate of heating is the controlling factor of the density and porosity of the product, together with the differences in the variously sized cells.

The mode of off-take should be as stated by Mr. H. Nielsen, who confirms the writer's work in this direction. Steaming is responsible for fracture, and greatly influences factors (1), (3), (4), (5), and (6), opening out the structure and eating away the graphitic film, if not used in excess of 10 to 15 p.ct., without any serious disadvantages.

The factors being many, it will be seen that tests on combustibility and reactivity should take into account the actual behaviour of the coked product as sized or produced; a comparison of the ground powders being useless, as it eliminates every factor of serious moment.

COMBUSTIBILITY AND REACTIVITY TEST.

As it appears that a suitable standard test on this practical basis is badly needed, the writer would suggest a tall, cylindrical, totally enclosed, water-jacketed fire-box, in the form (say) of a water heater, with controlled draught and water feed provisions, as a suitable method. Such an apparatus is afforded by the "Quickest Water Heater" (see "GAS SALESMAN" for Jan. 31, 1923), if equipped with a few accessories, such as a draught gauge, control valve, cistern, measuring meter, and thermometers. Either a constant flow of water through the heater or a constant temperature—say, the boiling point—together with a standard draught, could be arranged, and the fire-box lighted in a suitably uniform manner, when filled with a weighed quantity of fuel of standard size (or as produced of mixed sizes, if different methods of production are to be compared as to average size). The fuel should be allowed to burn right out, and the time therefor taken as a measure of the combustibility. A correction could be made of the error involved by any unburnt residue; the ashes being weighed and analyzed for volatiles and fixed carbon. The ultimate values obtained could then be expressed as mins. per lb. of fuel, both on the ash-free and inclusive basis.

Instead of air, oxygen could be substituted, as also steam added in various proportions, leaving it possible to compute the reactivity under these conditions. The amount of coke used should be around 10 to 20 lbs. at least. The test could further be prolonged by keeping the fire-box filled at intervals of (say) every 5 to 10 minutes or so, until some approved quantity of fuel had been burnt. It will, however, forthwith be seen that there is no particular factor upon which the reactivity of coke solely or mainly depends to such a degree that it may be considered to the neglect of other contributory factors. But in this respect density and porosity may be, perhaps, given first place among the impressed coke properties; and if variations in the ratios of or differences of porosity and density could be satisfactorily ascertained and quantitatively expressed, this might give an approximate resultant measure of all the coke properties.

DR. PARKER'S SUGGESTIONS.

Dr. Parker's suggestions along lines involving combined heating are also significant in so far as they confirm the writer's work. (See Patent No. 213,040.) It is, however, open to question whether Dr. Parker's basis would realize the 1 in. per hour rate of heat penetration which forms the basis of the writer's method. I do not think so; but if it does he has been anticipated, and the results he gives are amenable to appreciably greater improvement. Further, his detailed procedure for carrying out such a process suffers from the disadvantages of double capital charges for water gas and vertical plant, whereas the preferred method the writer uses realizes a higher gas quality and reduces the fuel expenditure on Dr. Parker's estimated basis for a much lower capital charge. Presumably Dr. Parker would use the "blow" gases for external heating; and the "run" gases for internal heating, in which case there probably would be too low a heating temperature to drive off all volatiles over and above 3 p.ct.

PRINCIPLES OF CARBONIZATION.

As Dr. Travers points out, there is great need to review the present available knowledge and also to direct future research work along lines of rational and comparative sequence—in other words, to systematize and correlate results and methods of investigation in this domain. The writer would here add that he has attempted a survey of the main factors along such lines in a somewhat synoptic manner; and this he is continuing. As, however, Dr. Travers particularly selected points of the mode of formation of primary tar, and as the question of the nature of coke is highly significant and interesting in this direction, he might like to have the following brief comments. The subdivision of the volatile therms into gases and liquids at 300°, 600°, or 750° C. is, the nature of the raw material apart, nothing else than a question of the relative thermal stabilities of the coal complexes and their loosened radicles, and of the concentrations and facilities for outlet of these ionic bodies. Coalition and polymerization there must be, while the varying influence of secondary decompositions and interactions are subject to temperature, pressure, atmosphere, concentration, and time of contact influences. The subject is, the writer considers, best studied by fractional distillation.

CONCLUSIONS.

It is, in the writer's opinion, evident that the combustibility of coke or semi-coke, as compared with present gas-works or coke-oven coke, can be enormously improved by application of the above principles, and that really the problem is one solely for large-scale experiment, rather than for the laboratory. The main factor, however, being economy, the rate of heating is the most valuable weapon in the attack and solution of the problem. Industrial coke, it appears, need not carry more than 1 to 3 p.ct. of volatile matter, whereas the domestic fire could well take up to 8 p.ct. or even more, so that flame might be obtained and ignitibility readily realized in all types of grates.

WALES AND MONMOUTHSHIRE JUNIOR GAS ASSOCIATION.

[At this meeting the Council's suggestion that "short-paper" evenings would prove of benefit was put into practice, with excellent results. Mr. G. H. G. Hughes, of Chepstow, read a short paper on the fixing and maintenance of gas engines, in which he gave many useful practical hints. This was followed by a paper on "Tar for Roads," by Mr. R. J. Williams, of Abertillery, who says we are modest when we assert that tar properly applied is equal in all respects to bitumen, with the further advantage that it does not produce the dangerously smooth surface which is a feature of bitumen. Mr. Williams attributes the increased use of bitumen during recent years to the active booming given to this product by the sellers, and to the easy way in which tar producers have treated the competitor.]

A Meeting of the Association was held at Cardiff, on Saturday, Dec. 5, when Mr. J. WOOD (the President) was supported by Mr. J. E. Mogford, of Cardiff, to whom the President extended a warm welcome.

The PRESIDENT referred to the unavoidable absence, through ill-health, of the Senior Vice-president (Mr. D. M. John); and, on the proposition of Mr. J. HISLOP (Newport), seconded by Mr. C. H. COLLINS (Swansea), an expression of sympathy was accorded Mr. John, together with good wishes for a speedy return to health.

The hearty congratulations of the Association were conveyed to Mr. T. V. Blake upon his promotion to the position of Assistant Chemical Engineer to the Cardiff Gas Light and Coke Company.

The HON. SECRETARY (Mr. W. E. Crowley, of Newport) reported the receipt of books presented by Mr. W. Cranfield and Mr. T. A. Canning.

Mr. MOGFORD intimated that he would be pleased to present to the Association's library the essays of Dr. Watson, Bishop of Llandaff. Dr. Watson, who had local connections, was one of the pioneers of the production of gas by the carbonization of coal.

A cordial vote of thanks was passed to the donors of books, on the proposition of the PRESIDENT, seconded by Mr. E. A. MARTIN (Merthyr).

GAS ENGINES—THEIR FIXING AND MAINTENANCE.

By G. H. G. HUGHES, of Chepstow.

After explaining the main features of construction, the author proceeded to say that some of the advantages of a gas engine are as follows:

(1) No trouble before starting.
(2) It can be started, or stopped, at a moment's notice.
(3) No boilers or flues to clean.
(4) No ashes or coal.
(5) No smoke or dirt.
(6) No regular attendant required.
(7) It occupies less space than equivalent steam plant.
(8) No expense when not in use.

Points to be considered in the selection of an engine are:

(1) Economy and efficient governing.
(2) Accessibility of valves and valve gear.
(3) Reliability.
(4) Simplicity.
(5) Durability.
(6) Substantial design.

The "GAS SALESMAN'S HANDBOOK" gives the following comparative costs, with coal at 46s. per ton, oil at 4s. per gallon, water at 9½d. per 1000 gallons, fuel oil at 1s. 4d. per gallon, gas at 9d. per therm, and electricity at 2d. per unit:

Cost per Hour—Based on a 20 B.H.P. Unit.

Town Gas.	Steam.	Oil.	Electricity.
s. d.	s. d.	s. d.	s. d.
1 3·3	2 8·3	2 8·4	2 8·3

FOUNDATIONS.

A plan is usually supplied by the makers showing the dimensions of foundation required for a particular engine. Generally speaking, it consists of a block of concrete, the mixture being three parts stock 1½ in. square, one of cement, and sufficient sand to make the whole a solid mass. The foundation should be some 10 to 12 in. longer and wider than the base-plate, and from 3 to 6 ft. deep, according to the size of the engine. It is essential that the foundation should rest on solid ground. A wooden template of the bolt holes in the bed is made, and boxes, about 6 in. in diameter, made of wood, which can be easily broken out, and reaching to within a few inches of the bottom of the excavation, are put in position according to template, and the concrete placed around them; the level, with the surface left rough, being about 1 in. below the finished bed, so that when the engine is placed on it with the bolts in position it can be levelled by means of iron wedges—the bolts, being free, allowing for the necessary squaring. The whole can then be grouted together with a mixture of two parts sand or gravel to one part cement. The ends of the bolts carrying the iron plate should be slotted, and iron wedges fitted in the slots. This will effectively prevent the bolts turning when pressure is exerted on the nut, on screwing the engine down.

When laying down an engine to drive shafting by belt, it should be so placed that the taut side of the belt is underneath. This allows of the slack being on top, and so gives an extra grip to the pulleys.

SERVICE, METER, AND PIPING.

In considering the size of meter required, an allowance of 25 c.ft. per B.H.P. per hour for engines up to 12 H.P. should be made; this allowance being reduced to about 20 c.ft. for larger sizes. This rate of consumption will also serve to indicate the size of service required, which will vary according to length and pressure. The quantity of gas available at the gas bag for the pull of the engine should be sufficient to ensure that the engine draws on the bag, which acts as a reservoir, and not on the meter.

Before commencing to fit up an engine with piping, the position of meter, bag, tanks, silencer, &c., should be determined. The size of the pipe from the meter to the gas bag, if of moderate length, must be of a dimension larger than that from the bag to the engine; and if the engine is fitted with tube ignition, the supply for the bunsen should be taken off near to the outlet of the meter, thus preventing any fluctuation of the flame. Care must be taken to see that the gas bag is blocked away from the wall, to allow of full distension and of the insertion of the hand between the wall and the back of the bag, to test, when the engine is working, whether the gas supply is deficient. A cock is inserted in the pipe near the inlet of the bag, to shut-off the gas when the engine is not working.

The gas bag is fitted on a wall close to the engine, in order to minimize the length of piping from the bag to the engine. The piping should be of the same size as the connection to the gas valve on the engine. An outlet cock is fitted as near as possible to the gas valve, its function being to rid the meter, bag, and piping of air which they may contain after the engine has been standing idle. This facilitates starting. By having gas undiluted with air ready for admission into the cylinder, the engine should fire on the second cycle. The omission of this test cock has, in many cases, been the cause of gas engines having a reputation for hard starting. The bunsen should be regulated to produce the hottest flame with the minimum gas consumption.

To prevent the water in the jacket freezing, if this is not emptied in frosty weather, a gas jet should be fitted under the cylinder, and left burning during cold weather when the engine is not working. Otherwise the freezing of the water might lead to a fracture of the cylinder.

AIR SUPPLY.

In some gas engines the base is used as a reservoir from which air is drawn by means of a pipe connected from the air valve into the base, and fitted at the inlet end with an adjustable valve. Where, however, solid matter is present in the atmosphere, it is advisable to connect the air to the outside of the building; and if objection is made to the noise of suction, a silencer can be fitted. The size of pipe required is the same as the connection to the air valve; and it should be carried away from the exhaust pipe, for, when the engine has been running for some little time and the exhaust pipe is hot, it will naturally heat-up the air pipe, causing the air to lose its density, so that the engine will not take the correct quantity.

EXHAUST.

All exhaust piping must be laid 12 in. clear of combustible material, to avoid any possible danger of fire. No elbows, only bends, should be used; and this applies equally to all piping employed in fitting up an engine. The best plan is to bend all pipes to a large radius, so that no back pressure is thrown on the piston, and the exhaust gases have a course of travel as clear as possible. As the exhaust gases contain steam, an outlet for condensed water must be provided at the lowest point, which is usually the silencer or expansion box. From the silencer the pipe is taken to some convenient place, and discharges into the atmosphere. When the noise may be a nuisance, the exhaust requires extra attention. One method of dealing with this trouble is to connect the outlet into a pit in the ground, or, if convenient, into a drain. There is risk attached to this method, as unburnt gas may find its way into the pit or drain, and an explosion may occur when the exhaust is emitted. Another way of dealing with the objectionable noise is to increase the size of the outlet pipe from the silencer, and to fit a short reducing piece of piping on to the extreme end, which reduces the violent noise to little more than a puff.

WATER.

The base of the water tanks must never be below the level of the top of the engine cylinder. It should be higher if possible; and if accommodation can be found for the tanks on the next floor above, the extra height will materially assist the water circulation. They should also be placed in such a position that air can freely circulate round them, so that the water

returning to the cylinder will be as cold as possible. A ball tap can be fitted—which must be the case if the water is used for any industrial purpose—or the loss of water due to evaporation can be made good by hand. In the pipe from the base of the tank to below the cylinder, a cock should be fitted for closing the water supply, and a run-off tap placed between the cock and the cylinder, so that the water jacket can be emptied in wintry weather or in the case of repairs. This prevents having to empty the tanks and wait for refilling after repairs are done. The return pipe from the engine must rise the whole of its length. This is very important, as a total stoppage of the circulation may occur if a dip is allowed. When more than one tank is used, and there is no internal division in the tanks, the return pipe from the engine enters about 3 in. below the top rim of the tank; and about 2 in. from the base of the tank a pipe is taken which enters about 3 in. below the top rim of the second tank. The connection to the engine is carried out 2 in. from the base of the second tank. All piping must be fitted in such a manner that it can be easily taken apart for cleaning purposes.

MAINTENANCE.

Care and attention are essential in securing reliability and economy. It is good practice, before starting, to examine the engine, to see that everything is in order. By this means possible stoppage or breakdown may be averted. The parts which require most attention are the ignition, valves and bearings, and cleanliness of the piston and cylinder. In tube ignition, if the asbestos lining becomes ragged and interferes with the structure of the frame, a new lining can be easily fitted. Metallic tubes become pitted and burnt with the heat; the remedy being to fit new ones. Electric ignition failures are caused by over-lubrication, dirty contacts in the brush gear, too wide a spark gap, or defective insulation in the plug. Dirty valves cause lack of compression. These should be periodically taken out, the stems cleaned, and the valves ground into their seatings with flour emery. Slackness in the bearings is caused by wear; those most affected being at each end of the piston rod. Trouble of this nature should be attended to at once, and all slackness remedied, as neglect may lead to a great deal of damage. Likely causes of failure to start are the sticking of the valve in the gas bag, dirty valves, the tube not being hot enough, and presence of air in the meter and bag. The remedy in each case is obvious.

Loss of power or irregular speed may be due to: (1) Piston rings being stuck with carbon deposit, and causing loss of compression. The piston should be taken out, and the rings, grooves, back of piston, and cylinder scraped free from carbon. Unsuitable oil is often the cause, and a change of oil to that recommended by the makers will make this occurrence less frequent. (2) Shortage of gas, which can be detected at the gas bag. (3) Too much gas, causing internal thumping in the cylinder. (4) Water or carbon deposit in exhaust piping and silencer, causing back pressure. (5) Overheating of the cylinder, due to partial stoppage in water circulation, or insufficient cooling of water due to smallness of the tanks or their position. The cylinder should never be hotter than can be borne by the naked hand.

Discussion.

Mr. MOGFORD congratulated the author upon the full details he had given as to the fixing and maintenance of gas engines. Were these carefully followed, he felt sure a greater demand for engines would be experienced. Prior to 1914, gas engines formed a considerable proportion of the load in industrial areas; and no doubt many more would be in use to-day were it not for the incidence of war conditions. In his opinion, suction gas was their most serious competitor, though he fully recognized the utility of the electric motor, particularly up to 5 or 6 H.P. and for intermittent loads. There should be a good field for gas engines between (say) 5 and 20 H.P.; but what was necessary for the full development of the business was cheap gas. In regard to the setting of valves, what he had done was to make a diagram showing the position of the opening and closing of each valve; and this would be found extremely useful. As for the exhaust, he found that widening the pipe overcame trouble.

Mr. T. A. CANNING (Newport) said that, as Mr. Mogford had indicated, in the pre-war period gas engines were far ahead of the electric motor in economical working; but the gap appeared to have been reduced. Many users pointed out that electricity to-day stood at the pre-war price for power. This was achieved at the expense of the consumers of current for lighting. In Newport, the cost for power was 1d. per unit; whereas for lighting it was 6½d., which was 50 p.ct. above pre-war. It was evident, therefore, that the lighting consumer paid the loss sustained on the low power rate—electricity being sold for power below actual cost, to enable the motor to compete with the gas engine. The same thing applied at Newport so far as electric heaters and cookers were concerned, the charge per unit being below the cost of production; but even with this unfair subsidy, they could not compete with gas. With regard to the figures quoted by Mr. Hughes, he thought the basis price of 2d. per unit for electricity was too high, and should be reduced to 1d. per unit. On a 20-B.H.P. plant, this would make the respective costs per hour: Electricity, 1s. 4·6d.; and gas (at 9d. per therm), is 3·3d. To compete effectively with electricity for power service, total cost should be considered, including repairs and maintenance, interest, depreciation, oil, water, and attendance. When one went into total cost, it was certainly difficult to draw an accurate comparison, owing to the greatly varying factors. The cost of running gas engines and electric motors was, of course, largely influenced by local circumstances; but it was certainly advisable not to accept as infallible makers' balance-sheets, as the public, generally speaking, were not influenced by bench tests—wisely preferring actual working results. The author had not given any comparative costs for suction gas, which he agreed with Mr. Mogford was a serious competitor. In the working of gas engines, water temperature, which should not exceed 140°, was an important factor.

Mr. C. S. THANE (Newport) said it was the usual practice of makers to supply timing diagrams; but, apart from this, engines with proper attention would run for many years without the necessity of removing the timing gear. He did not look with favour upon the slotting of bolts, but would prefer the fixing of rag bolts. Too rich a gas would cause failures in starting.

Mr. COLLINS (Swansea) thought the hints Mr. Hughes had given would be found extremely useful. He particularly emphasized the necessity of having a main cock near the engine, apart from the control fitted on the induction pipe. He had known neglect in this respect to lead to serious damage to meters. Another important point was the fixing of a small jet underneath the water jacket, in order to maintain the temperature above freezing point. He brought to memory two instances of the omission of this leading to serious fractures.

Mr. B. J. BELL (Cardiff) thought that the oil engine was also a serious competitor; and advocated a system of maintenance as being advantageous in the retention of existing business and the securing of additional sales.

Mr. T. V. BLAKE (Cardiff) expressed the opinion that in the installation of a gas engine the quality, composition, and specific gravity of the gas should be taken into consideration. Carbon monoxide and hydrogen, as was well known, needed half their volume of oxygen for complete combustion; whereas, on the other hand, the high illuminating constituents required sixteen times their volume. Thus it was very necessary that the composition of the gas to be supplied should be known, and the air supply for correct admixture maintained uniformly. As regards the specific gravity, it was a well-known law that the higher the specific gravity, the higher the rate of flow, which, of course, had its effect upon the good working of the engine. For fixing of engines he certainly favoured slotted holes in the first instance. These would lend themselves to any slight adjustment and prevent vibration.

Mr. HUGHES, dealing with the points raised, said, as regards the exhaust, he had found that the same treatment did not answer for two similar engines. Suction gas plants necessitated the handling of coal, dirt, and ashes, and the provision of labour, all of which were obviated by the gas engine. In fact, the whole of the eight advantages claimed by him for the gas engine were lost by the introduction of suction gas. The fixing of water tanks at too great a height should not be countenanced, as this would throw more pressure, which should be guarded against. He found that oil engines got dirty very quickly, and oil deposits led to trouble. He entirely agreed as to the importance of maintenance, and also as to the necessity of the makers having a knowledge of the composition of the gas.

NOTES ON TAR FOR ROADS.

By R. J. WILLIAMS, of Abertillery.

The first applications of tar to road making met with mixed results, due chiefly to the lack of experience in laying, and the fact that the tar was used almost in its crude state, attempts to drive-off the suspended water being made in the boilers on the roadside. However, shortly improvements were made, the road makers gained experience, and the tar producers realized that, to open a market in this direction, they would have to make the product more suitable. To do this, various types of simple stills were erected in order to drive-off not only the water, but a great portion of the light oil. Incidentally, the tarring of the water-bound road became a great factor in increasing the life of the road. It prevented the wind and rain washing-out the filler, which previously caused disintegration of the surface. It also made the road waterproof, thereby causing rain to drain away, thus eliminating the mud nuisance.

The success resulting from tar spraying led to the introduction of tar macadam, in which tar takes the place of the filler and greatly increases the adhesiveness of the aggregate. This material is generally prepared by a special plant which heats the broken stone and the tar separately, and then thoroughly mixes them. These roads, as usually constructed, are laid with three coats, consisting respectively of about 2½ in., 1½ in., and ⅜ in. tarred stone, each coat being separately rolled and consolidated.

In spite of the success of tar in general, there were still cases of failure. Road engineers found that different tars did not yield the same results when subjected to the same treatment. This is hardly to be wondered at when we consider that the composition, specific gravity, and viscosity of tar vary with the class of coal carbonized, the type of retort employed, the temperature of carbonization, the amount of free space in the retort, and the pressure in the retort. In view of the importance of the matter, the Road Board issued a Specification giving limits of the constituents of tars for various purposes.

After describing the "cascade" type of tar dehydrating plant installed at Abertillery, which is capable of dealing with 10 tons of tar per 24 hours, Mr. Williams said: I think there is general agreement that the process is very attractive from a financial point of view. It can be made a paying proposition to small works by the fact that the tar can be stored for a considerable time, and then the plant worked continuously until the whole of the stock has been dehydrated. The maintenance charges are extremely small, and fuel may be handpicked from the retort-house pan-ash at very small cost. The fact that every small

works has at least the possibility of disposing of its tar in the immediate neighbourhood should increase the attraction. I might say that at Abertillery 50 p.ct. of the tar produced is sold for use within the urban area.

Given a good tar, its success in road-making is not assured unless it is applied in the correct manner; and in this respect actual experience is a great factor. The surface of the road should be well brushed, and any holes made good. When the road is dry, the tar is heated in portable boilers, and applied at a temperature of about 250° Fahr. Sometimes it is applied by hand-spray, but more often by a special tarring machine which combines the boiler and spray. The No. 1 tar is used for spraying, except in very hot weather, when the No. 2 tar is sometimes used. The most important requirement of this operation is to have the correct proportion of tar and slag-grit covering, the usual proportions being 5 to 6 sq. yds. of road surface per gallon of tar, and 1 ton of ¼ in. to ⅜ in. slag-grit covering per 200 sq. yds. Tar spraying should never be attempted in wet weather, for in addition to its not adhering to a wet surface, the capillary action of the tar takes up some of the water, which defeats the object of dehydration. Wherever possible, it is desirable to close half the roadway under treatment, as it is hardly fair to allow traffic to pass over until the work is at least cool.

Given a Road Board tar, and applying it with the necessary precautions, a tar-sprayed road is above reproach.

Tar macadam is usually prepared at a special works, and carted to the site, though the writer has recently noticed that where long stretches of new roads are being made, a special portable plant prepares the material on the site. This material must be well rolled to cause adhesion of the aggregate. The fine surfacing material should not be put down in very cold weather, unless prepared on the site and applied warm. I have a case in mind where the top coat was applied during a frost, with the result that, when the thaw commenced, the surface disintegrated and had to be relaid. A coat of tar sprayed on this type of road greatly increases its life.

COMPETITION.

The use of tar for roads has suffered a severe set-back of recent years by the increased use of bitumen. A few of the contributory reasons for this are the active booming given the product by those who wish to sell it, the easy way in which tar producers have, until recently, treated the competitor, the effect of a circular issued by the Fisheries Board, and the crude, or almost crude, tar supplied by some producers.

As indicated by the tar exhibit at Wembley, great efforts are being made to re-establish the tar demand; and we may be assured that the aforementioned causes of the set-back will be effectively dealt with.

I have followed with interest the correspondence appearing in the "GAS JOURNAL" concerning the relative merits of tar and bitumen. While these correspondents went rather beyond the question at issue, I certainly think it is time our voice was raised. The importance of the matter is such that it should compel the interest of members of both manufacturing and distributing staffs. In support of this contention, I need only point out the effect on the gas undertakings of the recent slump in the coke market. It should be remembered that a 1d. per gallon increase in the price of tar is approximately equivalent to a 1s. per ton off the price of coal. While a 1d. per gallon increase, expressed as a percentage, is in the region of 20 p.ct., and is rather difficult to obtain, we must consider the possibility of the two extremes—an enhanced value of refined tar on the one hand, and, on the other, the possibility of losing the whole market. This latter effect would also cause a slump in the crude tar market.

We are modest when we assert that tar properly applied is equal in all respects to bitumen, with the further advantage that it does not produce that dangerously smooth surface which is a feature of bitumen. The correspondence already referred to called for unbiased opinions, and perhaps it would be fitting to quote two passages from Mr. John Wilfred Green's book on "The Elements of Road Making." The first is in reference to tar spraying, and reads:

> The efficacy of tar spraying in prolonging the life of water or tar bound roadways is now universally admitted. In addition to a saving in the life of the road, there is also saving effected in watering, weeding, and scavenging.

The second paragraph refers to tar macadam, and is as follows:

> Tar macadam has deservedly become one of the most popular surfacings of the present day, and it may be safely said to have proved a solution of many road-making problems on roads carrying a medium amount of motor traffic, and on suburban residential streets.

Added weight is given to these statements by the fact that they were written as recently as 1924, and that extensive road reconstructions had been carried out in the City of Durham, under Mr. Green's supervision, using several forms of road-making material.

Reference has been made to a circular issued by the Fisheries Board. This circular intended to inform road authorities that in cases where road washings discharged directly into fishing streams, tar should not be used, as its effect on fish life was detrimental. The wording was not as clear as it might have been, and the bitumen interests made good use of it to damage the reputation of tar. When we consider the small percentage of roadways which come under this category, we can afford to forfeit this section.

Bearing in mind the relative merits of these substances, the most important aspect of the case was recently presented to the Prime Minister in a letter signed by the President of the National Gas Council and the Chairman of the Joint Committee of the British Road Tar Association. The letter states, among other things, that tar is made from British coal by British labour, and its use indirectly renders it possible to reduce the price of gas, coke, and steel. This point cannot be too strongly stressed, for the effect of residual sales is quickly reflected in the price of gas; and in view of the widespread use of gas, the financial benefit is widely and evenly distributed, and becomes a factor in the many industries using gas for heating and power.

In all trade transactions there are two interests which have to be considered—of the buyer and of the seller. We must to a certain extent consider the requirements and often the fancies of tar users; and some of them have recently been stipulating a 10 p.ct. mixture of bitumen with the tar. While in my opinion it is more a fancy than a necessity, many works are installing plant to do this.

Another matter worthy of consideration is that of providing steel drums in place of the customary tar barrels. Road engineers complain that they cannot subject a wood barrel to heat, which is sometimes necessary to clear the vessel. In addition, there is at least a suspicion that a good deal of tar is lost through leaking tar barrels.

In conclusion, I should like to say that I am very optimistic of the ultimate result of the national propaganda just commencing; but we must realize that greater benefits will result from good service, and this must be given by every individual gas undertaking.

Discussion.

Mr. MOGFORD said that, in the past, tar prices had gone up very high; and the present market position could be traced to mistaken policy in this respect.

Mr. R. P. JONES (Cardiff) said his Company were creating a market for a tar mixture sold as a preservative. This was sold in 1-gallon drums; and it was hoped that a good field would be opened-up.

Mr. T. A. CANNING urged that, in the interests of trade revival, the home product should receive first consideration. Great damage had, however, been done to tar. It was considered an easy substance to apply, requiring no technical knowledge; whereas when other compositions had to be dealt with, special companies manufacturing the product were employed to put it down. Therefore an advantage which asphalt macadam obtained was due to the fact that it was laid by experts. It was up to the gas industry to see that the tar roads of the future were laid by competent men. They should frame the slogan "British Tar for British Roads," and propaganda should be so arranged that it would be impressed upon road authorities that tar should be efficiently and properly applied.

Mr. BLAKE remarked upon the low free-carbon content of tars from vertical retorts. He had carried out many experiments, and found the only way of thickening vertical tars was by the addition of soft pitch and bitumen, now a common practice. Their competitors had now introduced to the market "Coalas," which presented an advantage in the fact that it could be applied in wet weather. There was no doubt, however, that properly prepared coal tar gave a much better road in every sense of the word. It was naturally corrugated; and there was not the clinging effect found, especially by cyclists, on the bitumen roads.

Mr. A. E. MARTIN declared that he was an optimist in regard to the tar market. The proceedings at a recent congress showed that they had the sympathy of the road surveyors.

Mr. WILLIAMS, replying, said he was strongly of opinion that difficulties which might arise in the use of tar on roads were primarily due to the method by which it was applied. The gas industry produced the tar, but had no control in its application to the roads. Sales in small quantities were a big factor in a district such as Abertillery.

The PRESIDENT moved a hearty vote of thanks to the authors.

Mr. B. J. BELL, seconding, said the discussion promoted by Messrs. Hughes and Williams had amply justified the Council's introduction of short-paper evenings.

Distribution Department Lectures at Leamington.—In the paragraph on p. 646 of last week's "JOURNAL," stating that lectures have been given to the distribution department employees of the Leamington Priors Gas Company, it should have been stated that the one on "Gas Fires" was by Mr. W. L. Stringer, who is a member of Messrs. John Wright & Co.'s laboratory staff. The same firm are also arranging for Mr. Frederick Dye to give a lecture on the application of gas to water heating.

Sulphate of Ammonia Literature.—From the British Sulphate of Ammonia Federation, Ltd., of 28-30, Grosvenor Gardens, London, S.W., there are to hand copies of five new leaflets issued by them on the manuring of tea, coffee, cotton, rubber, and maize. They are full of practical information, and are excellently got up. Copies may be had, post free, on application to the Propaganda Manager of the Federation. No. 5 of "Farm Notes on Profitable Farming," also issued by the Federation, and edited by Mr. T. H. J. Carroll, B.Sc. (Agric.), F.R.H.S., is another publication which up-to-date agriculturists can hardly afford to be without.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the Hornsey Gas-Works.

On Saturday, Dec. 12, the Association visited the Hornsey Gas-Works. It is a good many years since they inspected these works; and those members who revisited them last week were able to see the vast progress made by the Hornsey Gas Company. In 1910 the annual make of gas was 527,082,000 c.ft., while to-day it is over 788 million c.ft. And when it is stated that throughout this period the price of gas has been extraordinarily low, the reason for the great interest displayed in this visit will be apparent.

DESCRIPTION OF THE WORKS.

The works occupy a convenient situation adjacent to the main line of the L. & N.E. Railway.

Coal Stores.—There are three coal stores, having a total capacity of 3100 tons. Each store is connected with the railway sidings; and as the floors of the stores are level with the yard and 27 ft. below the railway, the discharge of the coal with tip bottom wagons is effected with the minimum of labour. In addition, it may be mentioned that land is rented from the L. & N.E. Railway for the storage of 4000 to 5000 tons.

Retort House.—All settings are of the horizontal regenerative type, each bed having 9 through retorts, 23 in. by 16 in. by 20 ft. The house contains five beds erected in 1909, nine beds erected in 1910 (these fourteen beds replacing direct-fired retorts), and four added in 1922. The total number of mouthpieces is 324, and the maximum daily make is over 2 million c.ft. In 1914 the retort house was converted from hand charging to machine charging, and equipped with coal and coke handling plant. The charging and discharging machines are of the Guest-Gibbons type.

Coal Handling Plant.—There are two sets of coal breaking and elevating plant, with receiving hoppers for 90 tons and 100 tons respectively. The coal stores, being at high level, permit the placing of the coal breaking machinery above ground, which is obviously advantageous in avoiding the usual pit, and allowing all machinery to be under observation and easy of access.

Coke Handling Plant.—The hot coke conveyor is in one continuous length, 296 ft. 6 in. centres, and passes through a reinforced concrete tunnel in the coal store, and thence by an inclined path to a rotary screen, from which the sorted coke falls into storage bunkers. Bagging shoots are provided on the bunkers.

Condensers.—The condensation of the gas is largely dependent upon 24-in. and 20-in. steel mains running round the interior of the retort house. The final condensation is effected by two vertical water-tube condensers with a capacity of 2 million c.ft. per diem. These were erected in 1917. They are provided with ten 20-in. valves, which are so arranged that the gas can be passed through the condensers in series or in parallel, both forward and backward, or either condenser can be by-passed.

Carburetted Water Gas.—The plants are housed in a separate and substantial building, and consist of three steam boilers, and engines, blowers, generators, condensers, washers, and scrubbers. There are four sets, with a combined producing capacity of 3,500,000 c.ft. per diem. All the sets are fitted with reverse-make apparatus and valve interlocking gear. Pyrometers are fitted, establishing scientific control over the working and enabling the best results to be obtained. The gas distributing main is interconnected with the washers and scrubbers, so that the whole of the existing scrubbing and condensing plant becomes available for gas produced by all or any number of the generating sets. The air blast is provided by steam turbine blowing plants in duplicate; each consisting of a 30-H.P. De Laval steam turbine coupled direct to a blower.

The coke for the plant is taken by an inclined shoot direct from the rotary screen to the bogies. This arrangement relieves the coke bunker and saves labour in handling. The carburetted water gas passes from the plant to a small relief holder of a capacity of 55,000 c.ft.

Exhausting Machinery.—The exhausting plants for coal gas and carburetted water gas are housed under one roof. Both plants are in duplicate; the capacity of each coal gas set being between 140,000 and 155,000 c.ft. per hour, and that of each water gas set being 80,000 c.ft. per hour. After leaving the exhausters, the coal gas passes through a tar-extracting washer, two purifying machines, and a standard rotary washer-scrubber.

Purifiers.—These are as follows: One set for carburetted water gas, comprising four water-lute boxes; a duplicate of this for coal gas; and a further set for coal gas, comprising five luteless boxes—the last box being a catch purifier.

There are two station meters, each of a capacity of 80,000 c.ft. per hour. One is for measuring coal gas, and the other is for carburetted water gas. The gases meet at the outlet of the meters, and pass forward to the holders, of which there are two, both guide-framed in brick tanks, having a combined capacity of 1,289,000 c.ft. An additional holder of 3 million c.ft., it is interesting to note, is now under consideration. There are two station governors on the double cone principle. They were erected in 1886, but have recently been brought up-to-date, and made equal to modern equilibrium governors.

All electricity required is generated on the works. The power house contains three steam-driven direct-coupled sets—two of 60 KW., and one of 90 KW.

The products works consists of a sulphate of ammonia plant, with closed saturator, having a capacity of 3 tons per 24 hours; a tar dehydration plant of a capacity of 4000 gallons per 24 hours; and a benzole recovery plant, which is not at present in use. The pump house contains duplicate sets of electrically-driven rotary water pumps. Water is lifted 150 ft. from an artesian well by compressed air.

Inspection of a large and well-equipped laboratory completed the tour of the works, after which the members of the Association were entertained at tea in the Company's offices.

Mr. J. W. BUCKLEY, M.Inst.C.E., Engineer and Manager of the Company, offered the Association a hearty welcome, on behalf of his Board of Directors. He hoped that what the members had seen during their inspection of the works had been of interest and, perhaps, instruction. While there might not be a vast amount of novel machinery on the works, the Hornsey Gas Company sold gas at a price of which they were not ashamed—and this, after all, was what was wanted. The future of the industry depended largely on the production of cheaper gas, and this in its turn depended on the good work of members of the London and Southern District Junior Gas Association and kindred societies. Undoubtedly there was a great field before them. In connection with the Association's visit, he would mention that no prior cleaning-up of the works had taken place. He was a firm believer in keeping works in a thoroughly clean condition. The trouble taken was amply repaid; and he felt sure that all would agree that clean works and surroundings had a good moral effect on the workers. Reverting to the question of cheap gas, he urged upon them to reduce as far as possible capital expense, for this had a serious bearing on the price at which gas could be sold. Let each year bear its own financial burden. At Hornsey they endeavoured to work in every respect on strictly economical lines. Mr. Buckley said he was very glad to see with them Mr. W. J. Liberty and Mr. Cleave Cross. Also, he asked the Association to welcome his Assistant, Mr. Gandon.

Mr. W. L. WESTBROOK, President of the Association, said they had fully enjoyed, and benefited by, the visit. There was certainly no question about the admirable cleanliness of the works. The Hornsey Gas Company sold their gas at a low rate; and as a sequel to the efficiency of gas production, they were able to offer cheap coke. Personally he had been impressed by the excellent quality of the sulphate of ammonia. They had with them Mr. Scarth, who was the first Secretary of the Association. The fact that this gentleman was going to rejoin them spoke volumes for the work of the Association. There were also present Mr. Liberty, who at one time was President, and Mr. S. A. Carpenter, also a Past-President.

Mr. E. E. CALVERT (Gas Light and Coke Company), proposing a vote of thanks to Mr. Buckley and to the Directors of the Hornsey Gas Company, remarked that the Junior Associations derived much benefit from such visits as they had enjoyed that afternoon. He had been interested in the ingenious scheme which the Company had of dealing with the spent liquor from the sulphate of ammonia plant, and also in their water pumping plant. They were fortunate in being able to employ the water, without any treatment, as boiler feed.

Mr. M. WALKER (North Middlesex Gas Company), who seconded the vote, said that all had gained a great deal of knowledge as a result of the inspection. A feature which had interested him was the efficient coal-sampling device. Each fresh batch of coal was sampled, and tested in the laboratory; and this made for efficient and economical working.

Mr. W. J. LIBERTY supported the vote. He said that it was some twenty years since he last visited the works of the Hornsey Gas Company, during the year of his presidency of the Association. He was delighted to see the growth of the Company since then. In 1905 the make of gas was 442,531,000 c.ft., while by 1924 this had risen to 788,137,000 c.ft.

The vote of thanks was carried with acclamation.

Automatic Coke Skip Hoist.—The R. H. Beaumont Company, of Philadelphia, have supplied to the Webster Groves (Mo.) plant of the St. Louis County Gas Company a modern automatic skip hoist for the handling of coke. With a 75 ft. lift, 20 tons an hour are handled; the skip discharging into a 100-ton cylindrical bunker, from which the coke passes through screens to buggy cars, for the water gas plant. Started merely by pushing a button, the hoist works entirely automatically, and does not require an attendant. In loading, the skip bucket engages with, and opens, a "Simplex" loader, which is of the self-damming type, and is closed by the ascending skip bucket. The load is elevated and discharged, and the skip bucket returns to the pit, loading, ascending, discharging, descending, and continuing this cycle of operation until a "stop" button is pushed. Because of its few working parts, the skip hoist has proved an economical means of handling coke, as there is practically nothing to get out of order. As a bucket, steel cable, and winding machine comprise the entire equipment, the skip hoist has proved convenient for handling coke for water gas installations.

MANCHESTER AND DISTRICT JUNIOR GAS ASSOCIATION.

Visit to the Stockport Gas-Works.

Members of the Association to the number of 70 visited the Stockport Gas-Works on Saturday, Dec. 5, being received by the Chairman (Sir Thomas Rowbotham, J.P.) and the Gas Engineer (Mr. S. Meunier). Councillors Lomas and Burton were also present. The Chairman gave the visitors a hearty welcome, and the party then went round the works. Messrs. Stainer, Tavenor, Stockton, Singleton, Hoffman, Holland, and Card acted as guides; while the Engineer and his Assistant (Mr. W. Sowerbutts) also took parties.

PORTWOOD (STOCKPORT) GAS-WORKS.

A meeting to promote the erection of gas-works in Stockport was held at the Angell Inn in October, 1820, and a private non-statutory Company, with a capital of £10,000, was formed. The first works were erected in Millgate; and gas was supplied in 1821. Between 1826 and 1830 the Heaton Lane Gas-Works (in another township) were built.

In 1837 the Corporation of Stockport obtained powers to purchase the existing works or erect new ones, and in 1839 the Council acquired both undertakings for the sum of £21,493 10s. The number of miles of mains at this period was about eight, and the storage capacity 18,000 c.ft. At the present time the mains extend to about 215 miles, and the storage capacity is 4,500,000 c.ft. The growth of the undertaking is illustrated by the following figures of annual output:

	c.ft.
1865	95,000,000
1885	330,000,000
1905	704,000,000
1925	909,000,000

The undertaking has been carried on, during the major portion of its existence, under the guidance, as Engineer and Manager, of Mr. James Jaques (1865 to 1891), and Mr. S. Meunier (1891 to present day).

The Millgate Works ceased to be used about 1893, and the site is now occupied by the Electricity Department; while gas manufacture was discontinued at the Heaton Lane Works in 1907, and the plant dismantled, with the exception of one holder and a district governor. It is proposed to remove these in the near future, as the site is being gradually converted into a depôt for the Tramways Committee. The price of gas is now 3s. 6d. per 1000 c.ft. (9·34d. per therm), with a scale of rebates according to consumption down to 3s. 1d. per 1000 c.ft. (8·22d. per therm) for domestic purposes, and to 2s. 2d. per 1000 c.ft. (5·78d. per therm) for industrial purposes. The calorific value is about 450 B.Th.U. gross.

The present works at Portwood (which cover an area of some 9 acres) were laid out by Mr. Jacques in 1876, and gas making commenced in October, 1878. When the present Engineer was appointed in 1891, the manufacturing capacity of this works was about 750,000 c.ft. a day. Since then very considerable alterations and extensions have had to be made. Up to 1907 all the retorts were hand charged; but in that year the first installation of inclined retorts, with mechanical means for handling hot coke, was put into operation. The works at the present day comprise the following:

Inclined Retorts.—The inclined retorts consist of two benches each containing 72 retorts 22 in. by 16 in. by 15 ft., -shaped, with separate coal and coke handling plant, coke screens, and telpher, with a maximum capacity of 1,500,000 c.ft. per day.

No. 1 Vertical Retort Installation.—This comprises 24 7-ton Woodall-Duckham vertical retorts in firebrick, erected 1920-21, and having a nominal capacity of 2,000,000 c.ft. per day.

No. 2 Vertical Retort Installation.—This consists of 24 8-ton Woodall-Duckham retorts in silica, erected in 1924-25, and having a nominal capacity of 2,500,000 c.ft. per day.

Coal and Coke Handling.—Both installations are complete with coal and coke conveyors, each capable of handling 55 tons of broken coal per hour. The coke screening plant will deal with 30 tons of coke an hour, producing five grades at one operation. There is a storage capacity of 300 tons, and a coke bagging and loading stage.

Producers and Waste-Heat Boilers.—Each installation consists of two battery type benches of 12 retorts with step-grate producers at one end. Each retort is controlled independently, having its own secondary air, CO, and waste gas dampers and slides. Both installations are provided with a Woodall-Duckham fire-tube waste-heat boiler generating 4000 to 5000 lbs. of steam per hour at 120 lbs. pressure, superheated to a temperature of 600° to 650° Fahr.; the draught being maintained by turbine-driven fans.

Electricity Supply.—The whole of the coke handling and coal handling machinery is driven by totally enclosed A.C. motors, with worm reduction gear and slipping clutches, and Hans Renold driving chains where necessary. Contrary to the practice in the majority of gas-works, the whole of the electric current is taken from the electricity undertaking.

Tar and Liquor Pumps.—A battery of belt-driven centrifugal pumps is used to maintain a constant circulation of tar and liquor through the foul mains, and to supply the waste water from the gas condensers to maintain the seal of the extractors and assist in cooling the coke. The hot tar and liquor flowing from the plant are passed through a tubular cooler before admission to the storage wells.

Condensers.—Three vertical water-cooled tubular condensers are installed, capable of reducing 4,500,000 c.ft. per day of steamed vertical retort gas to 60° Fahr.

Exhausters.—There are two Bryan Donkin rotary exhausters, with horizontal steam engines. The larger has a capacity of 200,000 c.ft. and the smaller of 125,000 c.ft. per hour. The engine house also contains two Ingersoll Rand horizontal gas compressors capable of compressing 24,000 c.ft. per hour to 25 lbs. per sq. in. for supplying the village of Bramhall, over a range of 4 to 6 miles, from the works through suitable governors.

Station Meter.—The station meter is by the Gas Meter Company, and capable of passing 3,000,000 c.ft. per day.

Governors.—There are three district governors, 24 in., 18 in., and 16 in. diameter respectively, in close proximity to the engine house, and utilized for controlling the pressure on the different districts. This building also contains the valves for controlling the gas to or from either holder; provision having also been made for a third holder at a future date.

Wet Purification.—Wet purification plant comprises "P. & A." tar extractor and two washer-scrubbers, all of insufficient capacity for the present-day output. This plant is to be enlarged and re-modelled, with the addition of a stand-by exhauster for the maximum production in the near future.

Purifiers.—(1) A set of four purifiers (altered from water lutes to dry joints), with centre valve and two catch boxes, each 24 ft. by 24 ft. by 7 ft. deep, and separate meter, are available for the water gas prior to admixture with the coal gas stream at the inlet to the storage holders. By-pass connections are fitted on to the two purifier installations and meters, so that either gas may be passed through either set, as desired. (2) The coal gas purifiers comprise four elevated cast-iron boxes, each 57 ft. by 27 ft. by 5 ft. 9 in. deep, with hydraulic valves and seal boxes, and revivifying floor underneath. The oxide after revivification is prepared in a Carter's disintegrator, and afterwards elevated into hoppers prior to filling into the boxes. The purifiers are worked on the backward rotation system, with downward flow through the oxide.

Sulphate of Ammonia.—The ammoniacal liquor is worked-up into sulphate of ammonia in a Dempster plant, capable of producing 4 tons per day. Neutralizing is effected by spraying the salt in the centrifuge with ammoniacal solution; and the final drying is performed in a Wilton drier, from which the sulphate of ammonia is fed into bags and stored.

Steam-Raising Plant.—The present steam-raising plant comprises three 30 ft. by 8 ft. Lancashire boilers, fitted with Ferguson's superheaters and Wilton's forced-draught furnace for burning breeze. The water for the works' use is raised by means of a compressed air lift from an artesian well sunk into the sandstone measure. A portion of the hot water (which is fairly hard) overflowing from the condensers is treated in a Lassen-Hjort softening plant before use in the steam-raising plant.

Holders.—There are two four-lift column-guided holders, with flying lifts, on Messrs. Ashmore, Benson, Pease, & Co.'s rope-guided system, each having a capacity of about 2,000,000 c.ft.

Carburetted Water Gas Plant.—Two of Messrs. Humphreys & Glasgow's carburetted water gas plants (erected in 1897-99), with turbine-driven blowing fans, have a nominal capacity of 800,000 c.ft. per day. There are a spiral-guided relief holder, Bryan Donkin rotary exhauster, oil pumps, &c.

Tar Plant.—The tar plant is of the Hird gas-fired type, capable of distilling 20 tons of crude tar per day, and producing four fractions of oil and pitch.

Tea was served, by the courtesy of the Gas Committee, at the Warren Bulkley Hotel.

Mr. S. CARTER (Liverpool), in moving a vote of thanks to the Chairman and Committee, made reference to the up-to-date plant, and remarked upon the lighting, which he thought was excellent, and should be emulated by all works where men had to work through the night. He also alluded to the fact that their Hon. Secretary (Mr. J. Alsop) had at one time been a member of the Stockport staff, having served that Committee some seventeen years. Stockport had been a good friend to them as an Association. The Gas Committee had subscribed to the fund of the University Lectures inaugurated by them some years ago, and the Engineer held the office of Hon. Treasurer to the fund.

Mr. F. A. COLLIER (Oldham) seconded the motion; and the PRESIDENT (Mr. J. T. Haynes) expressed his personal appreciation of the visit.

Sir THOMAS ROWBOTHAM, in response, paid a high tribute to the Gas Engineer.

Mr. MEUNIER, in his reply, enjoined the Juniors to strike hard, and they would be sure to win through. He remarked upon the goodwill prevailing between himself and his staff, who were very loyal.

NOTES ON PURIFICATION.

The meeting which followed was occupied with the adjourned

discussion of Mr. Cook's paper "Notes on Purification," which was given on Nov. 11 at Halifax.

Mr. COOK (Southport) said that in connection with purification of ammoniacal liquor, they would notice he had stated that the Twaddell of the liquor at the condensers was 13½°. This was typed in error, and should read 11½. He referred to the "Register of Patents" in the "JOURNAL" for Nov. 25, pointing out that the Koppers Company, of Pittsburgh, had five patents in connection with purification by sodium carbonate. No. 240,891 gave the reactions that he had included in his paper, so that all the experiments had been confirmed. The Koppers Company now claimed 100 p.ct. H_2S and HCN removal. In conclusion, he enumerated as follows the many advantages of the system of purification by sodium carbonate over the present general method of oxide purification: (1) Less ground space. (2) No space required for revivification. (3) Saving in labour and reduced purifying costs, especially where steam is cheaply generated. (4) Reduced back pressure on exhauster. (5) Elimination of cyanogen compounds. (6) Reduction of CO_2. (7) Reduced maintenance costs in distribution department, mains, services, and meters. (8) Increase in calorific value, due to reduction in CO_2. (9) Reduction in sulphur compounds other than H_2S. (10) Capacity of all plant, holders, and mains increased. (11) Less pressure necessary for distribution purposes. (12) More reliable and simple plant, as the purification of gas containing any quantity of H_2S can be accurately controlled. (13) Ability to deal with water gas effectively. (14) Ability to deal with severe overloads in gas made due to weather conditions. (15) Safer in operation; no danger from firing or explosion. (16) Ability to use coal having high sulphur content without risk of purification plant breaking down. (17) Reduction in naphthalene due to the light tar oil and fog being washed down in the scrubbing action. (18) Low capital costs compared with oxide purification.

Many of those present took part in a highly instructive discussion.

The meeting then terminated.

SCOTTISH JUNIOR GAS ASSOCIATION.

(EASTERN DISTRICT.)

Visit to Alloa.

[To what extent public lighting can be held responsible for unaccounted-for gas is in many cases not sufficiently known. In a paper at this meeting Mr. Scott, of Alloa, considers the question as far as the by-passes and burners used in street lighting are concerned.]

The Eastern District of the Scottish Junior Gas Association, on Saturday, Dec. 5, visited the Alloa Gas-Works, where they were met by Mr. J. W. Napier (the Engineer and Manager) and his assistants (Messrs. G. Lawrie and W. Scott). On the works, special attention was given to the "T.I.C." tar plant, which has been recently installed by the Woodall-Duckham Company.

After the inspection of the works, the visitors were entertained at tea by the Corporation Gas Department.

Councillor JEFFREY (the Convener of the Gas Committee), in extending a cordial welcome to the Association, expressed the hope that the visit would be profitable, and a source of edification to the members present. He said he was proud of the Alloa Gas-Works, as being one of the most efficient in Scotland; and this was due to Mr. Napier and his efficient staff. He was pleased with the vertical retort installation; and remembered that Mr. Napier avoided spending money on the old setting until the time was ripe for the launching of a new scheme. This new scheme was undertaken at the right moment; the vertical retorts being completed in 1914, when the cost was very much less than would have been the case later on.

The PRESIDENT (Mr. A. McG. Clark, of Perth) thanked Mr. Jeffrey for his welcome, and said it had given the Association great pleasure to visit the works. He also thanked Mr. and Mrs. Napier, and the assistants, for the trouble they had taken to make the afternoon a success. Referring to the Institution Education Scheme, he said no doubt most of them knew the position in which members of the Eastern District of the Association were placed. The scheme, as far as they were concerned, was not practical; and on this account the Council had made a plea for relaxation of the rules for their members entering for the Institution examinations. One of their members had taken a correspondence course, the cost of which was £21. This reached a high standard; but owing to these certificates not being accepted by the Institution, he was debarred from their examination.

The following paper was then read:

PUBLIC STREET LIGHTING AND UNACCOUNTED-FOR GAS.

By WILLIAM SCOTT, of Alloa.

The data given in this paper are based on my experience with the Alloa Corporation Lighting Department, which is under the control of the Gas Department officials.

TYPES OF BURNERS USED.

Besides the town of Alloa, there are four villages which are supplied with gas; and the street lighting of these villages comes under their own supervision—inexperienced men attending to the lamps. The burners used in the villages are of the ordinary swan-neck type, fitted with governors to pass gas at the rate of 4 c.ft. an hour. Those in Alloa are of the superheater type, consisting of the twin, three, four, or six cluster burner, fitted with governors to pass 4, 6, 8, and 12 c.ft. of gas an hour. Lighting of private stairs, back courts, &c., comes under the supervision of the undertaking; and the ordinary bijou burner, with a governor to pass gas at the rate of 2 c.ft. an hour, is used. Incidentally, the arrangement for the lighting of stairs, back courts, &c., is entirely under the control of the Town Council. Proper supervision is therefore exercised over this usually somewhat difficult matter, and there is no longer trouble arising out of the dual control of landlord and tenant. The Town Council provide the bracket, lantern, burner, &c., fit them up, supply gas and mantles, light and extinguish, and maintain throughout, for the sum of 28s. per annum; the lamps burning up to 10.30 p.m. from Sept. 1 to March 31.

Some trouble was experienced from the three and four cluster burners not lighting; and on investigation it was found that the distance between nozzles was too great to allow the flame from one nozzle to ignite the gas from the others. Three suggestions were put forward to overcome this difficulty—first, to have additional by-passes; secondly, to arrange a cowl surmounting the burner, thereby causing an accumulation of gas which would ignite; and, thirdly, to discard the troublesome burners and replace them by others of a newer and better design. It was decided to adopt the last-named course. Putting on additional by-passes would have entailed a considerable expenditure, besides increasing the consumption of gas; and the cost, compared with replacement by new burners, would have been greater in the long run. Owing to the close proximity to the burners, a glass cowl could not be used, and a metal one would have deteriorated in a short time. Besides, illuminating effect had to be considered.

MANTLES.

The mantles used are No. 1 size for the twin cluster burner, No. 2 size for the three and four cluster burner, and No. 3 size for the ordinary swan-neck burners used in the villages. By using these sizes of mantles the best illuminating power is obtained; and, further, by using No. 2 size mantles on the three and four cluster burners the trouble of the burners not lighting is considerably lessened. It is observed that the small mantle can be better covered with the flame with a low consumption of gas than (say) a No. 3 size mantle, where the area of mantle to be filled is larger.

SERVICE PIPES.

The service pipes installed are ¾ in. M.I. (wrapped with Hessian cloth, and coated with Dr. Smith's solution), reduced to suit the lamp stopcock. The service pipes to street burners should never be less than ¾ in.; and to ensure success of the pressure-wave system of lighting, it was necessary to replace all ½ in. pipes.

GOVERNORS AND STANDARD NIPPLES.

One of the principal items in street lighting is to regulate the supply of gas passing to the burner. To achieve this, one method is to have standard nipples on the burners; the other is to fit governors. We have had experience with both systems; and governors are much preferred to standard nipples. Until recently the burners used in the villages were fitted with standard nipples to pass gas at the rate of 4 c.ft. per hour at 3½ in. water pressure. To show how easily the nipples may be altered or tampered with, by the thoughtless act of the local lamplighter, I have drawn-up the following table. At the end of a lighting season, all the burners are collected and tested, and any faulty ones are repaired or replaced.

Number of Burners Tested.	Number of Burners Passing More than 4 C.Ft. per Hour.	Number of Burners Passing Less than 4 C.Ft. per Hour.	Number of Burners Found Correct.	Minimum Rate of Flow.	Maximum Rate of Flow.	Average Rate of Flow.
69	58	7	4	2·8 c.ft. per hour	7 c.ft. per hour	5·1 c.ft. per hour

Since the introduction of "Peebles" governors, little trouble has been found with the burners, in respect of both illuminating power and gas consumption. I have tested several of these governors, and have found that a difference of pressure does not alter the rate of flow. This is a point which should be well noted, as the pressure of gas varies considerably in different parts of the distribution area. On testing the governors at the end of a season, only a few had altered—due to dirt. This was easily remedied by cleaning.

In charging for gas consumed by burners in public lighting, by-passes have to be considered. On testing by-passes at the pressure of the gas going to the burner, the consumption was found to vary between 0·3 c.ft. and 0·9 c.ft. per hour. All our by-passes are adjusted to burn at the minimum rate. By-passes

should be charged for in an inclusive rate per hour per burner, as the following table shows:

Rate of Consumption of Gas for Street Lamps, including By-Passes.

Rate of consumption of by-passes in c.ft. per hour . . .	0·3
Total hours per lamp per annum	7,704
" " " lighted (average) . . .	2,578
Non-lighting hours when by-passes are lit . .	5,126

600 lamps with by-passes at 5126 hours = 3,075,600 hours.
3,075,600 × 0·3 = 922,680 c.ft. per annum.
This quantity of gas, divided by the actual lighting hours of the lamps, $\frac{922,680}{1,546,800}$ = 0·6 c.ft. per hour. This quantity has to be added to the regulated hourly consumption of each burner.

The above calculation shows that, while the consumption of a by-pass is 0·3 c.ft., the aggregate quantity of gas consumed by one by-pass is equivalent to the large quantity of 0·6 c.ft. when applied to the hours of lighting—upon which the public lighting account is based.

UNACCOUNTED-FOR GAS.

To what extent public lighting can be held responsible for unaccounted-for gas is in many cases not sufficiently known. It can only be determined by proper investigation. I propose to consider it as far as the by-passes and burners used in street lighting are concerned.

The pressure-wave system requires the gas to be increased from its normal pressure to approximately 9 in. of water pressure in our case, and the time of duration is two to three minutes. The pressure stated appears to be excessive, but it is required to ensure successful lighting and extinguishing by this method. Where this method of lighting is used with burners fitted with standard nipples, the rate of consumption of the burners will be considerably increased during the two or three minutes the pressure wave is on. On testing at 9 in. water pressure a standard nipple made to pass gas at the rate of 4 c.ft. per hour at 3½ in. water pressure, I found the rate of flow to increase to approximately 6 c.ft. per hour. This means that, during the time the pressure wave is on, one nipple will pass 0·1 c.ft. of gas which is unaccounted-for. This at first sight appears to be hardly worth while considering; but taking two pressure-waves per night, and the number of nights the lamps are lighted as being 300, we get 60 c.ft. of gas unaccounted-for per burner. This figure calculated on the number of lamps in use—*e.g.*, 600—becomes a considerable amount—namely, 36,000 c.ft. When governors are fitted to the burners, this loss does not take place, as the rate of flow through a governor does not alter with the pressure.

From the foregoing it will be seen that the number of hours the by-passes are lit is 5126. Taking the minimum rate of 0·3 c.ft. of gas per hour, each by-pass during the season consumes 1538 c.ft., which, taken over 600 lamps, means a consumption of 924,800 c.ft. As stated, this figure is based on the minimum rate of consumption. But how many by-passes are adjusted to this rate? An increase of 0·1 c.ft. over the minimum rate means 512 c.ft. of gas per by-pass, equivalent to 307,200 c.ft. when 600 lamps are in use; and I would remind you that the rate of consumption may vary between 0·3 c.ft. and 0·9 c.ft. per hour.

CARE OF BURNERS AND FITTINGS.

Before a lighting season commences, all the burners should be cleaned and tested by a capable person, and any faulty ones should be repaired or replaced. When a faulty burner is discovered during the season, and repairs are necessary, they should not be left to the lamplighter or a plumber. These people have one method of dealing with the matter—namely, increasing the quantity of gas passing to the burner.

When fitting burners in street lamps, every care should be taken to see that the joints are tight and that the burners stand vertically. One important point in street lighting is to keep clean the glass panes in the lamp. Many good lights are considerably lowered in illuminating power by having the glass dirty; and any extra expense incurred in having the lamps cleaned regularly is well worth while.

Discussion.

Mr. LAING (Brechin) asked if special tips were used in the by-passes, so that they passed 0·3 c.ft. per hour.

Mr. SCOTT said that the by-passes used were of the Bray type, and had regulators attached.

Mr. MORTON (Kinross) asked if 9 in. was not an excessive pressure to operate controllers.

Mr. SCOTT, in reply, said that governors were fitted to all lamps, and that in their case 9-in pressure was necessary.

Mr. J. R. MOYES (Stirling) suggested that public lighting was a source of advertisement to a gas undertaking.

Mr. RICHMOND (Penicuik) remarked that governors should be fixed on all lamps.

Mr. SCOBIE (Hon. Secretary) considered ¾-in. services satisfactory for lamps. In his opinion all services should be coated. In Dunfermline, when any street was relaid, all services in that street were removed, larger ones being installed if required. In all cases the services were coated; the preparation being a product from their own tar plant. The pipes were then wrapped with Hessian cloth, and another coat was applied. All services, said Mr. Scobie, should be laid by the gas undertaking. He recently came across a case in which a ¾-in. pipe was supplying two households—and this property belonged to a master plumber.

Mr. SHORT (Kelty) expressed the view that the pressure-wave system was more applicable to small mantles. In Kelty they had reverted to clock controllers, so that there would be no alteration of pressure, and consequent disturbance of consumers.

Mr. NAPIER remarked that it was preferable to take for a basis of calculation the number of hours lamps were lighted, rather than the meter registration. He agreed with Mr. Short that, with the pressure-wave system, there was a certain amount of disturbance of consumers.

SCOTTISH JUNIOR GAS ASSOCIATION.

(WESTERN DISTRICT.)

[In a practical and well-considered paper, Mr. Ronald Keillor, of Greenock, draws the distinction between "waste" heat and "surplus" heat, and outlines the various means by which the latter can be utilized to the best advantage.]

A Meeting of the Western Juniors was held on Saturday, Dec. 5, in the Royal Technical College, Glasgow—Mr. ROBERT GRAY, President, in the chair.

SURPLUS HEAT AND THE AVOIDANCE OF WASTE.

By RONALD D. KEILLOR, of Greenock.

[Extracted.]

The gas industry produces, according to the size of the units employed, considerable quantities of surplus heat, which should be utilized The principal sources are the flue gases from retort and boiler settings; hot water from gas and ammonia plant condensers; exhaust steam and exhaust gases from various types of engines; and also the blast gases from water-gas plants. Strictly speaking, the heat required to promote natural draught for the effective working of retort settings is not "waste." It does necessary mechanical work, and cannot therefore be classed as a waste product. Any excess above the normal is waste, and should be avoided. Do not have more surplus heat to deal with than is unavoidable. To-day the average thermal efficiency of coal carbonization in vertical retorts is about 75 p.ct., the balance of 25 p.ct. representing the heat used and lost in the process. It follows, therefore, that if by improved working, or by the use of ancillary plant, this balance could be reduced, the thermal efficiency of carbonization would be correspondingly increased. Broadly speaking, the most likely means of effecting a reduction in the amount of heat lost are: (1) The introduction of larger and better-designed step-grate producers, controlled intelligently; (2) the avoidance of unnecessarily high temperatures; (3) dependable and efficient recuperators; (4) the insulation of settings and main flues; (5) pan-ash recovery plant; and (6) waste-heat boilers.

The amount of combustible fuel in the ash from the average producer is amazing; and to a large extent this waste is the result of careless producer control. The installation of coke recovery plant for the producer ashes masks undue waste, but in my opinion this method should only be adopted when all else fails.

PRODUCER DESIGN AND CONTROL.

The introduction of the step-grate was not an immediate success as a fuel economizer, but experience has proved it to be all that was originally claimed for it. Best results are obtained when there are long intervals between ash removal periods—say, once in 24 hours. When the fuel is of average quality, even gentle rodding of the fuel bed is not considered to be an advantage. It is necessary to have ample grate area, and a thick fuel bed between the centre of the step-grate and the gas off-take flue. If such conditions prevail, there will be no inducement for the primary air to "short" up the front and back walls of the producer. The supply of water and steam has also an important bearing on the efficient working of a producer. Attention given to these points will ensure slow travel of air and steam through the fuel bed, with the exothermic reaction in the proper place, and more coke available for sale over the weighbridge. If the method of producer control adopted results in nothing but ash—or at least nothing but ash *plus* the unavoidable minimum of combustible material—being sent to the tip, then our enterprise is to be commended, and the undertakings we serve are profiting by the avoidance of unnecessary waste

Before passing from this subject, I will express the opinion that large settings of retorts in the future will be heated by clean gas from external producers with mechanical grates. I have in view the Kerperly type of producer for either coke or

breeze, the evident advantages of which should more than outweigh any disadvantages.

Control of Carbonizing Temperatures.

The next subject to be touched upon is the control of carbonizing temperatures and recuperation—both matters of prime importance from a gas-making point of view. There is much temptation to work settings with high white heats, but it only pays to carry high temperatures when results prove their necessity. Excessive temperatures are wasteful of fuel and ruinous to brickwork, and should be avoided. When steaming vertical retorts, higher temperatures are required than when carbonizing coal to produce straight coal gas; and to prevent heat losses even greater care has to be exercised in the manipulation of temperatures than is ordinarily the case. If the weight of steam admitted to the retort is not altered to suit the weight of coal being carbonized, the apparently simple process of blowing steam into a retort becomes a serious source of waste. The practical way to determine the weight of steam permissible under local conditions is to run tests at various steam pressures with a fixed size of orifice (or *vice versa*). The amount of CO_2 in the resultant mixed gas is a good approximate guide to the extent of the decomposition of the steam admitted, provided that infiltered CO_2 is absent. It must be borne in mind, of course, that the maximum decomposition of steam passing over coke takes place at about 1050° C. Therefore the temperature and depth of incandescent coke will really be the deciding factors. After all, the thermal efficiency of carbonization with regard to the steam-coal ratio depends upon the extent to which steam can be decomposed. Unless retort settings are specially designed to give a greater depth of incandescent coke, steaming above 25 p.ct. of the weight of the coal only serves to manufacture useless quantities of CO_2, and to dilute the liquor in the wells. These are additional sources of avoidable waste.

Where a half-hearted method of waste-heat recovery is employed, high carbonizing temperatures invariably defeat their own object. Perhaps future practice will incorporate plans for the preliminary heat treatment of coal by the waste flue gases as part of the process of coal carbonization. As regards recuperation, it is understood, of course, that the air necessary absorbs only a limited amount of the available waste heat; but, keeping in view the fact that profits are made by savings, every little counts, and the practice should be diligently extended and, wherever possible, improved. Theoretically the temperature of the secondary air should be raised to the temperature of the waste gases entering the recuperator. Present-day recuperators, however, are unable to approach this ideal, handicapped as they are by their liability to split and short-circuit. Long, circuitous, and elaborate regenerators are highly inefficient and a nuisance; but until a more efficient and robust recuperator is forthcoming—a recuperator in which waste gases and secondary air have no chance of mixing—we must make the best of those provided. Now that induced draught has been tried successfully, and the possibility of firing with clean producer gas is within our reach, an infallible recuperator giving a high efficiency is not an impossibility.

Even with carefully regulated combustion chamber temperatures, tight flues, and efficient recuperation, the surplus heat passing from modern settings represents 30 to 35 p.ct. of the total heat value of the coke used for firing the producers. At present the only practical method of recovering this heat, or at least a portion of it, is by the use of waste-heat boilers. This method enables us to bring down the temperature of the waste gases close to the temperature of the absorbing surfaces of the boiler. The introduction of waste-heat boilers designed to reduce the temperature of the waste gases to about 200° C. necessitates the use of mechanically-induced draught; and it is noticeable that the application of this system gives a much steadier pull on retort settings than is possible with chimney draught only. The adjustment of dampers is not now dependent upon the vagaries of the weather. Furnace conditions and heats are more easily regulated and fuel can be economized. The heat losses by radiation and convection from retort settings are comparatively small; but until some thoroughly practical and inexpensive method of insulating settings is devised, it heats are more easily regulated, and fuel can be economized. The main waste-gas flues, however, especially when of considerable length, should be carefully insulated; and it is equally important that they should be easily accessible and air-tight. Interesting papers on the question of waste heat recovery were given recently by Mr. J. S. Thorman (see "Journal" for Dec. 1, 1923) and Mr. C. H. Bamber, B.Sc. (see "Journal" for Dec. 15, 1923).

The excellent work carried out at Birmingham by the Research Sub-Committee of the Gas Investigation Committee of the Institution of Gas Engineers is a mine of valuable information. To a large extent the value of this investigation lies in the fact that it is an account of accurate tests carried out under normal works conditions. It may be assumed from the report that waste-heat boilers, where practicable, and after supplying the power for mechanical draught, feed pump, &c., are capable of recovering as superheated steam approximately 25 p.ct. of the heat value of the coke consumed in the producers. Where the infiltration of air is not excessive, this figure may safely be relied upon to give the approximate net weight of steam obtainable from the use of retort setting flue gases.

Boiler power is invariably provided to deal with the bulk flue gases leaving the retort installation, but the same efficiency cannot be obtained when only a section of the settings is in daily use. When only one-half of the retort settings is at work, the boiler output falls off by more than one-half. Messrs. Spencer-Bonecourt, Ltd., now supply a special Kirke combined waste-heat and producer-gas fired boiler which includes an external range of tubes that may be fired with producer gas, or town gas, when the available waste heat falls away.

The Greenock carbonizing plant, installed in 1914, consists of two benches of Woodall-Duckham continuous vertical retorts. A waste-gas flue runs alongside each range on a level with the base of the settings. These two flues are controlled by separate chimney dampers. The site for the waste-heat boiler being limited in area and directly under the main flues, a Kirke fire-tube boiler 7 ft. in diameter by 17 ft. long was installed. The bottom of each main flue had to be broached, and new dampers working horizontally had to be fixed in suitable positions. The flue gases are brought down to the boiler within a brick-lined and externally lagged steel flue. A "Sirocco" fan, driven by a Howden reciprocating steam engine at the side of the boiler, provides the induced draught and discharges the waste gases back into the main flues and the chimney. The original chimney dampers now function as boiler by-pass dampers.

A Ferguson superheater is fitted in the waste gas inlet to the boiler, and there is a "Weir" feed pump supplying the boiler with highly preheated water. The exhaust steam from the fan engine and a Holden & Brooke high-velocity feed heater provide an ample supply of hot water for the boiler. Thermometers are installed for checking the inlet and outlet temperatures of the flue gases. A Ronald Trist "Thermofeed" regulator and "Hilo" water alarm are included in the boiler equipment; their function being to ensure steady steam generation and a minimum of attention, with the certainty that the water is always kept at the proper working level. The highest efficiency is obtained from a boiler when the hot feed water is admitted at a rate just sufficient to maintain the working level.

The following figures give the average of tests carried out over a period of some weeks on the Spencer-Bonecourt boiler at Greenock:

Dry coal carbonized per 24 hours	95	tons
Dry coke to producers per hour	1,414	lbs.
Total water evaporated from and at 212° Fahr.	109,272	"
Steam generated per hour	4,553	"
Steam per lb. of dry coal	0·5	"
" " " coke	3·22	"
Steam used by fan engine and feed pump (10 p.ct.)	455·3	"
Net steam generated per hour	4,097·7	"
Steam used in retort house (calculated)	2,660·0	"
Balance of steam for other works purposes	1,437·7	"
Steam pressure (gauge pressure)	85	"
Temperature of superheated steam	410°	Fahr.
Temperature of waste gases entering boiler	880°	"
CO_2 in waste gases entering boiler	12	p.ct.

I will consider briefly the fuel saving attributed to the use of the waste-heat boiler (labour and the smaller tonnage of fuel and ashes now handled being considered). In the year prior to the installation of the boiler, solid fuel for steam raising cost 1·28d. per 1000 c.ft. of gas made. Last year the cost was 0·242d. per therm, or 0·99d. per 1000 c.ft. made. The difference —0·70d. per therm—made does not strike one as being a big saving; but when the fractional saving is applied to the total gas made, it figures out at £709 per annum—a sum sufficient to pay 10 p.ct. capital charges on an outlay of £7000.

Even the heat in the waste products after passing through a boiler carries away energy capable of doing useful work, and might yet be used in tar distillation or some other process.

Discussion.

Mr. James Hall (Glasgow) said that Mr. Keillor had dealt with his subject in a comprehensive manner. The utilization of surplus heat was most important. It used to be said that gas-works were easily recognized by the great display of steam; happily these days were now past. With regard to the producers, he thought pricking only once every 24 hours indicated a fortunate state of affairs. He usually found this necessary every eight hours. He was not convinced that ash recovery was a paying proposition, and thought that when a high percentage of combustible fuel was recovered from ashes, there was something wrong elsewhere.

Mr. J. McIsaac (Glasgow) remarked that the initial cost of insulating a setting might be high, but the saving in fuel, as a result of this insulation, more than off-set the outlay.

Mr. J. Cubie suggested that ash recovery plants did not constitute a good advertisement for gas engineers.

Mr. Fife (Kilmarnock) expressed a preference for forced draught in producers, rather than induced draught.

Mr. Gray (Hamilton) pointed out that the fuel recovered in ash recovery plant was not coke, and could only be used for secondary purposes. To make it a paying proposition, the percentage would require to be high. He would like to know if, by the installation of a waste-heat boiler, the fuel for heating retorts had been reduced. He thought that the life of a waste-heat boiler must be short, owing to the wear and tear of the exposed parts. He agreed with the other speakers that the brickwork of settings should be insulated.

Mr. Keillor, in reply, said he thought it was a paying proposition to recover fuel.

AMERICAN GAS ASSOCIATION.

REPORTS AND PAPERS REVIEWED.

First Article.

GAS PLANTS AND GAS QUALITY.

The great fluctuations in the cost of oil for gas manufacture, with unstable and changing rates, the possibilities of large demands due to the taking-on of house-heating customers, together with other and equally serious problems, have, said Mr. J. A. Perry (of the United Gas Improvement Company, Philadelphia), in a paper on this subject, caused a feeling of uncertainty among many of the men prominent in the American gas industry as to the permanency of present types of gas manufacturing apparatus. The question which he considered is: Are we going to face new and more economical processes, which will scrap our present plants, or can we plan with confidence our works developments with existing types of gas manufacturing plants, and economically and satisfactorily fit them in with future processes of gas manufacture, or with processes of manufacture that are now undergoing the first stages of development?

With this question in mind, one must first consider the changes (if any) that must be made in the heating value and other characteristics of the gas to make possible the handling of the extreme variations in daily output. The "base gas," or gas used throughout all seasons of the year, should be made from raw materials of which the major portion is likely to remain at a uniform, as well as at a low, cost in the future. The base gas, and all other gas, should be of such a quality or gravity that peak loads can be supplied with a different kind and type of gas of substantially the same heating value and gravity. The major portion of the peak-load gas and heating gas for cold-weather use should be made by apparatus capable of producing large volumes on short notice; and owing to the great fluctuations in the cost of gas oil, and the probability of still higher prices in the future, the quantity used per 1000 c.ft. of gas should be as small as possible. The foundation for the base gas—especially for that portion of the United States east of the River Mississippi—should be coal gas of (say) 570 B.Th.U. All other gas to complete the making of the base gas, and for the foundation of the peak gas, should be produced by the use of coke.

If the foundation plant for the base gas—any good type of coal gas manufacturing plant—is equipped with central coke-fired producers, there is at hand a cheap gas-making apparatus producing a gas of about 130 B.Th.U. having a specific gravity of about ·9, which can be used for mixing with the foundation 570 B.Th.U. coal gas for reducing the quality and bringing up the gravity to the same point that may be required for the peak gas. Thus, with 70 p.ct. coal gas of a gravity of ·43 and 30 p.ct. producer gas, the base gas (which could always be produced with existing types of coal gas plant and producers) would have a heating value of round about 440 B.Th.U. and a gravity of ·57. The peak gas might be provided by carburetted water gas apparatus producing, with 1·75 gallons of oil per 1000 c.ft., a gas having a heating value of 440 B.Th.U. and a gravity of from ·57 to ·60. Such peak gas might better be made by large companies, as extensions become necessary, by manufacturing carburetted water gas of 580 B.Th.U. heating value in existing apparatus, and blue water gas of (say) 300 B.Th.U. in new blue gas apparatus, which would give, with equal proportions, a peak load gas averaging 440 B.Th.U.

This arrangement would make it possible to extend for supplying the heating or peak load with a cheap construction and a minimum amount of new apparatus; and it would utilize the existing water gas apparatus in the same manner as at present. The blue gas and carburetted water gas in this case should go to the same relief holder and through the same purifiers, so that the peak gas could be kept well mixed and of a uniform quality before it was delivered into the regular storage holders for mixing with the base gas.

Tests have been made on these suggested base and peak gases—viz., a base gas consisting of a mixture of coal gas and producer gas of 440 B.Th.U. and a peak gas consisting of a lightly carburetted water gas of the same heating value; and it has been found that, with appliances properly adjusted for the base gas, the peak gas can be used up to as high as 75 p.ct. in the mixture without there being any cause for complaint, except for the gas irons, some mantle lights, and one type of water heater.

Further tests have indicated that a 400 B.Th.U. base gas of substantially 60 p.ct. of 570 B.Th.U. coal gas and 40 p.ct. of 130 B.Th.U. coke producer gas can be used in all existing appliances with 440 B.Th.U. carburetted water gas, and *vice versa*; the appliances, being equipped with suitable orifices and adjusted for air for either kind of gas, working satisfactorily when switched to the other kind of gas without change of orifices or air adjustments.

ARCHITECTS AND GAS SUPPLY.

The Architects' and Builders' Service Committee (whose report bore the signature of Mr. W. A. Adams, of the People's Gas Light and Coke Company of Chicago), with the objective of a 50 p.ct. increase in gas sales as an accepted goal for the industry in the next three years, have had in mind the clearing away of obstructions and the laying of the foundations upon which this great sales structure can be erected. With this end in view, they have been impressing upon gas companies the necessity for providing in advance the facilities for the consumption of gas in homes through which future sales of gas will flow. Greater gas consumption per head means the use of more appliances and the more extensive utilization of existing ones; but all this means provision of proper piping and flues in the houses. The architects make up a group which, though wide in influence, is relatively small in number and easily reached; and they are also the starting-point for the specifications which make or break the future possibilities of gas sales. It is therefore towards this group particularly that the Committee have endeavoured to stimulate the efforts of the gas companies.

The Committee submitted various recommendations for the carrying on of the campaign; one being the consideration of the question of engaging the services of a consulting architect for the Commercial Section, to advise and assist in the preparation and use of propagandist material. The recommendation, however, to which they attach the greatest importance is one urging the drawing-up of standard specifications and suggestions for flues for all gas-burning equipment requiring them. At present the Association have no general specifications.

It is felt by the Committee that one of the greatest single factors which will influence the future of the gas industry lies in a proper foundation for the use of gas; and, to use their own words, "surely there is no better time to lay that foundation than when a building is contemplated."

GAS REFRIGERATION.

The Refrigeration by Gas Committee endeavoured to give in their report as complete a résumé of the subject as could be done in the time at disposal. They have not had time to compile any statistics regarding the manufacture of ice machines for household use; but this omission they hope later to supply. Meanwhile, they have secured sufficient information to lead them to the belief that the time for the development of artificial refrigeration is at hand; and that the sooner the manufacturer, the gas company, and the public realize that the absorption type of machine, coupled with the use of gas, presents opportunities in a very interesting field, the better it will be for all concerned. Although essentially dealing with small household refrigerators, the Committee are very optimistic that the future of refrigeration is far from restricted to such operations. When the heating season arrives, the public begin to light their fires to warm-up the rooms. It is not unreasonable, therefore, to expect that this same discriminating public will find that, when the summer temperature goes considerably above 70°, they will be too warm for comfort, and consequently will seek methods by which to bring down this temperature. That this condition is already an actuality is shown by the numerous theatres, halls, and office buildings in which the air is now cooled, during the summer, before being admitted to the various rooms in which the public gather.

THE NITROGEN SITUATION.

The report of the Committee on Economic Factors Influencing Production, Sale, and Consumption of Bye-Product Ammonia in the United States, which was prepared by Dr. Harry A. Curtis, Professor of Chemical Engineering at Yale University, contained a considered view of the influence on the position of the rapid progress of the air-nitrogen industry—mainly due to the determination of various countries to attain self-sufficiency in the matter of nitrogen supply for military purposes. The Billingham Works of Synthetic Ammonia and Nitrates, Ltd., were cited as an example. What Great Britain is doing, the Committee think, is more or less typical of the activities in other countries—France, Poland, Italy, Belgium, Jugoslavia, Czechoslovakia, &c.—although some of these have rather a large potential market for agricultural nitrogen, if it can be produced cheap enough. To serve their purpose as military adjuncts, these plants must be operated and kept up-to-date, and their products must be sold at whatever the market will bring. Meanwhile, the agricultural demand increases, but relatively slowly. Cheaper nitrogen products will no doubt accelerate the agricultural application, particularly in those countries—such as France—where the soils lack nitrogen; but a temporary over-production of nitrogen products appears almost inevitable, and this over-production can only be relieved as agricultural demand grows or as European countries abandon subsidy of nitrogen production, and leave the industry to adjust itself under normally operating economic factors.

In the case of those countries which have heretofore imported most of their agricultural nitrogen, the domestic production of nitrogen fertilizers will necessarily reduce imports, and nitrogen products in world trade will meet a falling market. A general lowering of nitrogen prices in world trade must speedily influence the domestic market in the United States. While it does not seem probable that any very large and sudden drop in the market can result, nevertheless a general lowering of nitrogen prices appears imminent; and producers will do well to consider this possibility.

ILLUMINATING ENGINEERING SOCIETY.

What About Gas?

We had almost written "Electrical Illuminating Engineering Society." Certainly this title would have been no misnomer at the opening meeting of the Society which was held on Thursday, Nov. 26, at the Royal Society of Arts, Adelphi, W.C. It is customary at these opening meetings for manufacturers and others less directly interested in the progress of illumination to give demonstrations of the improvements which have been effected in lighting units. Formerly exhibits have included both gas and electric lamps and fittings; but on Nov. 26, though electric lamps hung round the lecture theatre of the Society of Arts like toys on a Christmas tree, there was not a gas lamp to be seen. Bearing in mind that at nearly every meeting of the Illuminating Engineering Society the idea is broadcast that the Society takes a broad view of illuminating engineering, and knows no favour, the total eclipse of gas lighting equipment gave rise to thought. Is it that the gas industry and the gas lamp manufacturers are not moving with the times? It is hard to believe this. Only a few weeks ago an opportunity was afforded of inspecting the remarkably effective interior and exterior gas illumination of the Gas Light and Coke Company's new showrooms at Islington—a lighting scheme which combines elegance, hygiene, eye-comfort, and convenience (for all lights are switch-operated) with economy. And with regard to outdoor lighting it is only necessary to think for a moment of the excellent illumination at Scarborough, and the lighting of the New Street Station, Birmingham—to mention two examples—to realize that gas is progressing, and can hold its own against any other form of illuminant. However, having recorded this fact, we will pass on to a few notes of the meeting itself.

STREET ACCIDENTS AND LIGHTING.

An address on recent progress in illuminating engineering was given by Mr. L. Gaster, in which he stated that the Regent Street Polytechnic have taken the enterprising step of arranging a permanent course in illuminating engineering, which is now proceeding. It is to be hoped that other educational institutions will also make arrangements to deal more fully with the subject. The question of producing a special text-book on illuminating engineering for the use of teachers, said Mr. Gaster, is also receiving consideration. Mention was also made of the fact that the E.L.M.A. Lighting Service Bureau has organized courses for salesmen. Mr. Gaster is of opinion that future progress depends greatly on the education of the public. In this connection he has several times suggested that an official inquiry into street accidents should be held, with a view to tracing the part played by inadequate and unsatisfactory lighting. The acquirement of these data would lead to the recognition that responsibility for any accidents due to lack of adequate lighting should rest on the public authority concerned.

INDUSTRIAL LIGHTING.

Discussing industrial lighting, Mr. Gaster referred to the report of H.M. Inspector of Factories for the past year, in which a case is mentioned where 13 to 23 foot-candles are now provided, as compared with 1 foot-candle formerly available. Many improvements have been observed. The two years which have elapsed since the issue of the Third Interim Report of the Departmental Committee on Lighting in Factories and Workshops have been utilized in bringing their recommendations to the notice of managers. Great interest has been shown, and offers to send an inspector equipped with an illumination photometer have been welcomed. It is evident, observed Mr. Gaster, that the work of the Home Office Committee has had a material influence on industrial lighting, and that the sympathetic methods of the Home Office in enlisting the aid of the industrial councils, and encouraging the study of lighting conditions, has had good results. Allusion was also made to the investigations of the Committee on Illumination working under the Department of Scientific and Industrial Research.

THE FIELD FOR GAS AND ELECTRICITY.

Anyone who suggested that electricity should oust gas for all purposes would be very small-minded; and he who put forward the view that gas should take the place of electricity for everything would be equally absurd. There is a field for both; but it does not follow as a corollary to this statement that the illuminating field should be wholly the preserve of electricity. That is the point it is desired to stress here. As a matter of fact several highly ingenious and interesting electrical instruments were demonstrated at the meeting. One was a multi-chrome lantern by which it is possible to see the effect of any suggested colour scheme. This instrument should find valuable application not only in industry, but in the realms of pure art. And then there was exhibited an anti-dazzle headlamp which has gone far to solve the harassing problem of glare. The lamp is a standard "Osram" gasfilled bulb. The top half of the bulb is sprayed with a thin layer of yellow, unglazed china. The cut-off produced by the sprayed portion takes place along a plane running through the centre of the lamp bulb and headlamp. The upper, or dazzling, portion of the beam, which is dangerous to other road users, is replaced by a softly-diffused yellow beam which in no way impairs the vision of approaching motorists and pedestrians. At the same time the full driving light is maintained on the road.

AUTOMATIC GAS CONTROLLERS.

Mr. Horstmann explained in some detail the automatic controllers manufactured by the Horstmann Gear Company, Ltd., of Bath. A new model, Type 3B/UNI, having a 16-day run, has recently been perfected by the firm. It is fitted with a movement exactly similar to the standard double power driven Type 3, which has been described in the "JOURNAL," with the exception of a slight modification which increases the speed of the fly and results in a slightly slower movement of the gas cock, thus enabling the pilot to be extinguished in one operation during lighting hours. The actual time taken to turn the gas on and off is about 9 seconds, which allows ample time for the pilot to relight from the main burner when turning off, but does not cause interference with the gas and air mixtures sufficiently to cause lighting-back or sooting-up of the mantles. The movements are all detachable and interchangeable on all gas cocks.

Mr. Horstmann stressed the point that in the "Newbridge" controllers all necessary operations can be carried out at the lamp head with one hand—a great advantage for the attendant. The "on" and "off" tappets can be set in any desired position; and as the cover cannot be replaced until the centre clamp locking the tappets is snapped down, this acts as a safety device. The gas cock, he explained, is entirely separate from the movement, so that gas cannot leak into the clock mechanism; and the act of winding neither stops the clock nor rotates the dial. With Type 3 movement, which is also used in Type 3B/UNI described previously, the gas can be turned on and off by hand without disturbing the sequence of operations.

Magnetic Separation.

In a paper dealing with machines used in magnetic separation, which he submitted on Wednesday (Dec. 9) to the Institution of Chemical Engineers, Col. B. I. Rolling, D.S.O., described the process employed by Krupps for separating slags containing iron from coke and other fuel residues. It has been found that the greater part of fuel residues which are no longer combustible possess magnetic properties, as they contain iron compounds (pyrites) to a small extent, which are converted in the fire to certain oxides of iron, and appear in the ashes and slag as silicates by fusion with SiO_2. These slags, containing this small amount of iron, are attracted and firmly retained in highly concentrated magnetic fields by the use of magnetic separating materials, while the unburnt coal and coke remain unacted upon by the magnetic fields. Thus unburnt coal is regained together with the coke. Even the finest material can be treated, and the fuel contained therein easily recovered. In view of the simplicity of the equipment, it is possible to instal a profitable plant for a very small output, such as would not be an economical proposition in the case of a wet mechanical plant. The newer process enables the whole of the fuel contained in the material treated to be completely separated independently of the size of the grains and the specific gravity of the fuel and the slag; it being quite immaterial whether coke or unburnt coal is present. On the other hand, said the author, in the wet mechanical process a large portion of the fuel passes on with the slag, owing to the size of the grains, and is thereby lost. In the ash from pit coal this portion amounts on the average to 25 p.ct. of the total furnace residues; and it may be as much as 50 p.ct.

British Cast-Iron Research Association.

A growing membership is recorded in the fourth annual report of the British Cast-Iron Research Association. There is, however, still room in the ranks for representatives of engineering works, &c.; and in this connection it may be pointed out that every £1 subscribed by members enables the Council, with the aid of the Government grant, to spend £2 for the direct benefit of the industry in experimental investigations, the results of which are circulated to members. Thus every member gets in return more than his actual subscription. Much research and experimental work is in progress. For example, in one direction the aim is to examine the properties, both in the laboratory and in the foundry, of a complete range of natural British moulding sands, and to devise tests for their control and mixing in the foundry; and in another, to reveal the constitution of cast iron best calculated to resist heat, and to ascertain further the variations required to suit particular industrial applications. Then there is a complete study of the production of malleable iron, and of the properties of grey iron, as well as of the physical, chemical, and microscopic properties of cast irons yielding an all-pearlitic structure. The Association are also assisting, jointly with the Institute of British Foundrymen and the British Engineering Standards Association, in the establishment of test specifications for grey, malleable, and pig iron. Again, they are considering the constitution and properties of cast irons designed to resist abrasive wear, which investigation should enable the service life of such irons to be lengthened; and the determination of the influence of the addition of aluminium on the properties of cast iron.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Horizontal Retort House Practice.

SIR,—I read with considerable interest Mr. T. A. Canning's paper on "Horizontal Retort House Practice" published in your issue for Nov. 18.

In one paragraph (p. 440) he makes the following statements: "The chief causes of heat losses in a regenerative setting . . . are as follows:

"(3) Reduction of CO_2 to CO in upper portion of producer fuel bed. (Endothermic reaction.)

"(6) . . . decomposition of water contained in the primary air."

Surely Mr. Canning has missed the fundamental principle of producer practice, which is to utilize the endothermic reactions

$$CO_2 + C = 2CO$$
$$H_2O + C = CO + H_2$$

to convert the sensible heat of the producer bed into chemical or potential heat in the form of a combustible gas. This gas is then burnt with secondary air to the best advantage in the setting.

C. HAMILTON FOOTT.

5, Princess Street, Barnsley.
Dec. 10, 1925.

Tar Interests or Briquette Makers?

SIR,—In the report in your issue for Dec. 2 of the meeting of the Conference of Associations of Local Authorities, at Islington, the Chairman is reported to have said:

> He remembered having an important deputation from the tar interests asking him to issue a circular letter to the local authorities of the country telling them that they should not use tar upon the highways, but should get anything else, because they wanted all the tar that they made for the purposes of briquetting material.

Sir Henry Maybury is in error in stating that the deputation in question came from tar interests. It came from the consumers of pitch, and was the subject of a very lengthy correspondence between myself and the Secretary of the Patent Fuel Manufacturers' Association, which you were good enough to print *in extenso* in your issue for March 7, 1923.

I should not have troubled to take notice of Sir Henry Maybury's remark except that the same allegation has been made against me (I understand by him), and has come to me through other channels.

HERBERT M. ROBINSON,
Chairman.
The Midland Tar Distillers, Ltd.,
Exchange Buildings, Birmingham.
Dec. 14, 1925.

[The point referred to by our correspondent was commented upon in an editorial article on p. 564 of our issue of Dec. 2.—ED. "G.J."]

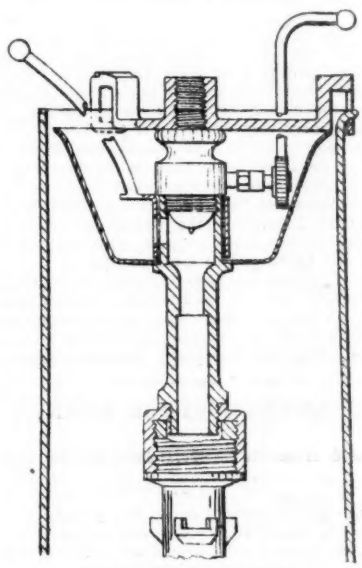
REGISTER OF PATENTS.

Incandescent Burners.—No. 242,099.

CROFT, C. M., of Wandsworth, S.W. 18.

No. 29,244; Dec. 5, 1924.

The object of this invention is to provide an incandescent gas burner with a shield located within a translucent globe which substantially hides the burner and mantle from view.



Croft's Inverted Burner.

In one form of construction, of which we reproduce an illustration, the shield forms an inverted frustum of a cone, and extends from a point a little below the air inlet ports in the mixing tube, nearly up to the usual globe supporting spider, from which a cylindrical globe of silica or fireproof glass can be suspended. The shield serves to deflect the products of combustion away from the air inlet ports in the mixing tube, thus enabling air for combustion to enter. The handles for controlling the air and gas are extended upwardly to project above the globe carrier.

Grill or Gas Cooker.—No. 242,062.

KEITH & BLACKMAN CO., LTD., and KEITH, G., both of Farringdon Avenue, E.C. 4.

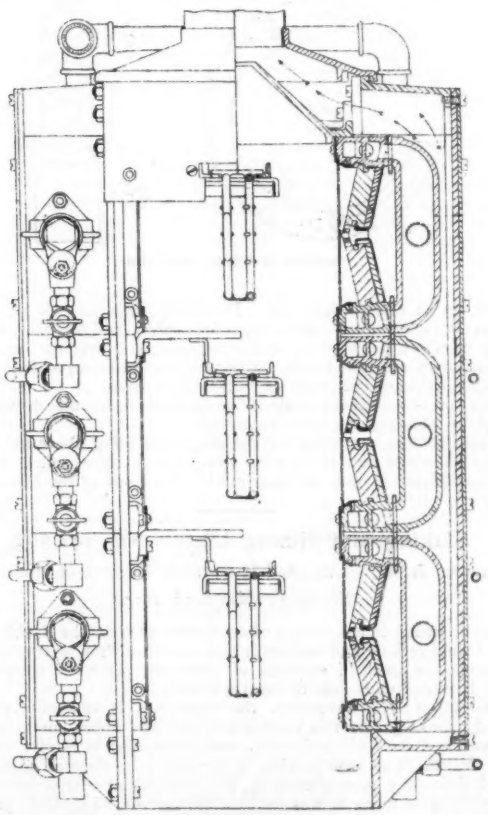
No. 25,321; Nov. 24, 1924.

This invention is for an appliance for grilling or cooking at one time a group or number of superposed groups of steaks, chops, &c.; one object being to provide a grilling unit employing radiants exposed to the flames of low-pressure gas burners so contrived and disposed as to ensure approximately uniform heating of the radiating surfaces, and that without overheating the burners and without escape of useful heat from the grill into the room.

The grill comprises an upright chamber or oven having at one side, or on opposite sides facing one another, heating units arranged in tiers, each pile of units being carried by a framework built up so as to avoid risk of fracture due to expansion strains.

Each unit comprises a vertical metal plate or radiant heated from the back, there being arranged behind the plate an upper and a lower burner box extending over the length of the unit. The burner boxes of each pair are preferably fed by a common injector connected to the burner boxes by a casing set in a flue at the side of the oven. The injector is preferably arranged to supply partially aerated mixture to the burners, and the plate is perforated for the passage of secondary air, which is drawn in by the pull of a chimney surmounting the oven and connected to all the flues.

Between the perforated plate and the casing structure are disposed an upper and a lower radiant, and an intermediate perforated radiant; the upper and the lower radiant being inclined to



A Keith-Blackman Grill.

one another, and the salient presented thereby being directed towards the perforated plate. The inclined radiants may be of brick or other suitable heat-resisting material, and are preferably backed by insulation. The upper burner box is positioned above the upper inclined radiant, between the same and the perforated plate. The lower burner box is positioned below the lower inclined radiant, between the same and the perforated plate. The upper box has downwardly opening vertical outlets and also downwardly and forwardly inclined outlets, the flames from the vertical outlets impinging on the upper inclined radiant, and those from the inclined outlets being directed on to the metal plate. The lower box corresponds.

Combustion is completed at the perforations in the metal plate; and the products of combustion escape rearwardly through the perforations in the intermediate radiant, and ultimately pass to the chimney.

With such an arrangement the perforated metal plate is heated evenly over its entire area. The inclining of the upper and lower radiants compensates for the tendency to fall-off of the heating effect of the flames after they leave the burners. Again, the provision of the inclined outlets from the two burner boxes compensates for the fact that the portions of the radiants nearest the burner boxes are less highly heated than the portions a short distance away from the burner boxes. The perforated intermediate radiant extracts the final residue of available heat from the flames, and ensures that the part of the perforated plate opposite the outlet for combustion products is heated substantially equally with the rest of the plate.

The back of the flue into which the radiants are fixed is insulated by an asbestos sheet or the like.

Each injector may be associated with a by-pass device and with means for the regulation of the gas supply. With this arrangement, assuming that the gas supply has been turned on full and that the radiants are at their maximum temperature, the articles to be grilled are introduced into the oven, and thereafter the gas supply adjusted to a minimum, so that in the first few moments the steaks or the like are exposed to a high radiant heat and thereby sealed on the outside, after which the radiants will quickly cool down to the predetermined minimum temperature, and the grilling operation will proceed more slowly.

We reproduce a part-sectional elevation of the grill, which gives an idea of the arrangement.

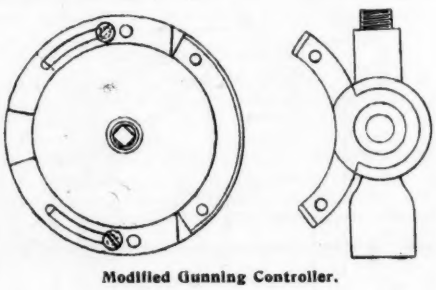
Automatic Gas Valves.—No. 242,880.

Gunning, J., of Bournemouth.

No. 11,078; April 28, 1925.

This invention relates to clockwork mechanism for automatically opening and closing a gas-tap at predetermined times. In such apparatus it is important that the mechanism should be readily detachable, for adjustment or other purposes.

With this object, the socket part of the gas valve is formed with, or has attached thereto, one or more arcuate strips which are adapted to be applied to the cylindrical casing of the clock mechanism and to be secured in position thereon by means of one or more clamps,



Modified Gunning Controller.

which can be readily displaced. Preferably there is a dowel connection between the arcuate strips and the casing, and the clamps are in the form of arc-shaped bars capable of being slid over the ends of the arcuate strips attached to the gas cock and to be clamped in this position by suitable means, such as a screw or screws.

Such an arrangement will be understood from the drawing we reproduce, showing the parts separated.

A modification, providing for the plug cock being above the casing, is also described and illustrated; and the patentee points out that other modifications may be made within the scope of the invention.

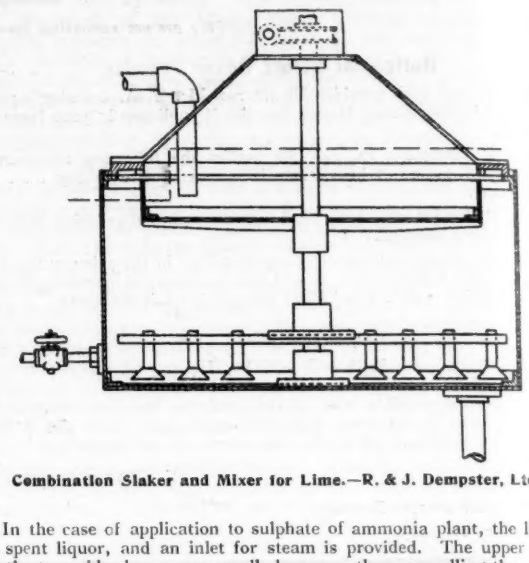
Slaking and Mixing Lime.—No. 242,865.

Dempster, R. & J., Ltd., and Holton, A. L., both of Manchester.

No. 8094; March 26, 1925.

This invention is for a form of apparatus wherein the double operation of slaking lime and mixing it into cream of lime is attained, and which can be used in sulphate of ammonia plant, in which spent liquor is mixed with lime to form a cream.

According to the invention, the apparatus is self-contained and divided primarily into two compartments. The upper one is an open tray mounted on a vertical shaft, and is intended to receive the lime to be slaked. The base portion of the tray is perforated so that the slaked lime may pass eventually into the lower compartment, and preferably in a more or less continuous manner. Liquid is provided within the apparatus and means for agitating the contents of the lower compartment. Outlets are formed for the finished cream, and the necessary valves and inlets are provided.



Combination Slaker and Mixer for Lime.—R. & J. Dempster, Ltd

In the case of application to sulphate of ammonia plant, the liquid is spent liquor, and an inlet for steam is provided. The upper edge at the tray sides has a very small clearance, thus compelling the steam supplied to the lower compartment, and used for boiling and agitating purposes, to pass into the upper compartment by way of the perforations or openings referred to, and thereby assist in the slaking process.

The lime is fed in between the bars of the framework which supports the head of the vertical shaft.

A sectional elevation of one form of the apparatus is reproduced.

Rotary Scrubbers.—No. 242,404.

Gas Light and Coke Company and Eve, E. W., both of Horseferry Road, S.W. 1.

No. 23,717; Oct. 7, 1924.

This invention refers to washer-scrubbers of the kind in which a series of bundles, porous screens, or elements is mounted to rotate within a chamber containing solvent liquid; and it results in about 80 p.ct. of the total capacity of the case being filled by the bundles, so that a scrubber of very high efficiency is provided, with a consequent reduction in housing space, cost of foundations, and transport.

The feature of the invention is that the bundles are so arranged as to fill practically the entire space between the central shaft or boss and the inner periphery of the casing, and permit the passage of gas therethrough in the direction of the axis of the machine. The outer elements of the bundles form pockets with the solid outer plates thereof, which are U-shaped in cross section.

The bundles or wetted elements comprise perforated plates bolted or otherwise secured together, and supported in the sectors between the radial members of a frame. The drums containing the bundles are provided with faced plates engaging the sides of annular plates arranged in the casing and interposed between adjacent drums.

APPLICATIONS FOR PATENTS.

[Extracted from the "Official Journal" for Dec. 9.]

Nos. 30,135-30,815.

Bailey, P. H.—"Gas meters, &c." No. 30,239.
Cooper, C.—"Drying fuel gases." No. 30,796.
Dempster, Ltd., R. & J.—"Gasholders." No. 30,261.
Gill, G. M.—"Condensation of vapours from gas retorts, &c." No. 30,484.
Henshaw, D. M.—See Cooper, C. No. 30,796.
Holmes & Co., Ltd., W. C.—See Cooper, C. No. 30,796.
Hopkins, B. D.—"Surround for gas fires, &c." No. 30,677.
Howard, T.—"Cooking appliance for gas rings." No. 30,517.
Imray, O. Y.—"Horizontal chamber ovens." No. 30,228.
Kohlenveredlung Ges.—"Retorts." No. 30,814.
Lechler, P. [Firm of].—"Gasholders." No. 30,343.
Naamlooze Vonnootschap Silica en Ovenbouw Maatschappij.—See Imray, O. Y. No. 30,228.
Redfern, W. D.—"Gas heated boilers." No. 30,639.
Scott, J. W.—See Dempster, Ltd., R. & J. No. 30,261.
Shakeshaft, C. E. M.—See Bailey, P. H. No. 30,239.
Trent, W. E.—"Method of treating coal products." No. 30,586.
Trobridge, E. G.—"Domestic gas, water, &c., supply services." No. 30,591.

The daily list of contributions to the Leeds University Extension Fund was headed on Dec. 11 by the handsome donation of 500 guineas by the Institution of Gas Engineers. The same list included a donation of 5 guineas by the Drighlington and Gildersome Gas Light Company.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

Royal Assent.

The Royal Assent to the Bexhill Corporation Bill was reported on Thursday, Dec. 10.

The Campbeltown Harbour and Gas Order confirmation was returned from the Commons agreed to; the Royal Assent being reported on Dec. 10.

Northampton Gas Order, 1925.

On Dec. 9, the Draft Special Order proposed to be made by the Board of Trade under section 10 of the Gas Regulation Act, on the application of the Northampton Gas Light Company, was approved. The following clause for the protection of the Northamptonshire County Council has been added:

> The following provision for the protection of the Northamptonshire County Council (in this section referred to as "the County Council") shall, unless otherwise agreed upon in writing between the Company and the County Council, apply and have effect—that is to say:
>
> Section 8 of the Gas-Works Clauses Act, 1847, incorporated with this Order, shall be read and have effect as if in respect of any street, bridge, sewer, drain, or tunnel, under the control or management of the County Council, the period of fourteen clear days were inserted therein instead of the period of three clear days in the said section mentioned, and the notice therein mentioned shall be given to the surveyor of the County Council: Provided that this subsection shall not apply in the case of any opening or breaking-up for the purpose of laying, connecting, or repairing consumers' service pipes.

Special Orders.

The following Special Orders were agreed to on Dec. 10: Port Talbot Gas Order Hornsey Gas Order, Leigh Corporation Gas Order, and the Lea Bridge District Gas Order.

HOUSE OF COMMONS.

Progress of Bills.

The Campbeltown Harbour and Gas Order Confirmation Bill: Considered; read the third time, and passed without amendment.

Smoke Abatement Bill.

This Bill, to which reference was made in last week's "JOURNAL" (p. 668) has been withdrawn.

Local Authorities (Sale of Coke) Bill.

A motion by Mr. Beckett for leave to bring in a Bill to extend the powers of local authorities, empowering them to supply coke, was negatived in the House on Wednesday, Dec. 9.

Public Health (Smoke, &c., Abatement) Bill.

A Bill "to amend the law relating to smoke nuisances and noxious or offensive gases, and for other purposes," was presented last Thursday by Dr. Salter supported by several other members of the House, and is to be read a second time to-morrow (Thursday).

Gas Regulation Act.

On Tuesday of last week it was ordered that the draft of a Special Order proposed to be made by the Board of Trade under section 10 of the Act, on the application of the Great Yarmouth Gas Company, be referred to a Select Committee.

On the 10th inst., on the motion of Sir Burton Chadwick, it was resolved that the draft Special Orders relating to the Leigh Corporation, Hornsey Gas Company, Port Talbot Corporation, and the Lea Bridge District Gas Company be approved. The Special Order of the Northampton Gas Light Company was also approved, with the addition of a clause fo the protection of the Northamptonshire County Council.

Import Duty on Gas Mantles.

The resolution to impose a duty on gas mantles, to which reference was made in last week's "JOURNAL" (p. 668), was passed, after considerable discussion, last week, and thereafter Sir P. Cunliffe Lister presented the Safeguarding of Industries (Customs Duties) Bill, which was read the first time. The second reading was passed, and the Bill committed to a Committee of the whole House.

Gas Light and Coke Company's Standard Price.

Mr. SCURR last Thursday asked the President of the Board of Trade whether he had received an application from the Gas Light and Coke Company under section 1 (3) of the Gas Regulation Act, 1920, for an Order to increase the standard price of gas from 11d. to 11'4d. per therm; whether he was aware that the dividends paid by the Company were £5 6s. 8d. p.ct. in 1924 and £5 1s. 4d. p.ct. in 1925; and whether, considering that the costs of production had not increased since 1923, he would afford the House an opportunity for discussing the matter before making any Order.

Sir B. CHADWICK replied that the application in question had been received. He was informed that the Company paid a dividend of £5 6s. 8d. for the year 1924, and that for the first half of the present year they paid a dividend at the rate of £5 6s. 8d. per annum, but that, owing to an increase in the price of gas, they would be authorized to pay for the current half-year a dividend at the rate of only £4 17s. 4d. per annum. In considering the application, the Board of Trade would have to decide whether the costs of production had, in fact, altered. Objections to the application had been received from local authorities within the Company's area of supply, and, accordingly, the Board proposed to hold a public inquiry. In these circumstances, and having regard to the fact that the Board in this matter were exercising powers delegated to them by Parliament, he was not prepared to vary the customary procedure.

THE HORLEY COMPETING ELECTRICITY SCHEMES.

A Curious Situation.

A lengthy debate took place in the House of Lords on Tuesday, Dec. 8, when the FIRST COMMISSIONER OF WORKS (Viscount Peel) moved that the Horley and District Electricity Special Order be approved.

The EARL OF CLARENDON moved, as an amendment, to leave out all the words after "that" and to insert, "having regard to the decision of a Select Committee of this House upon the Horley District Gas Company (Electricity Supply) Bill, the Special Order be not approved." He said he moved the amendment as Chairman of the Select Committee who heard both cases and gave the Horley Gas Company their Bill. The Order had appeared under somewhat unusual circumstances, and it raised important considerations of procedure and policy. Two applications were made. First, there was the Order promoted by a small electricity company in the district of Horley, and in the second place there was a Bill presented by the Horley Gas Company, whose application was heard by a Select Committee of this House. The Gas Company was an undertaking of some years' standing, and had carried on operations most successfully, so far as the supply of gas was concerned, in the district of Horley. The Company were obliged to adopt the procedure of promoting a Bill, for the simple reason that the new Electricity (Supply) Act was not upon the Statute Book, and they were unable to avail themselves of its procedure. They accordingly followed the course sanctioned by Parliament. The Electricity Company was formed, and application made for support, after it was known that the Gas Company intended to promote their Bill; and the Gas Company, in September, 1924, advised their opponents of this fact. The Electricity Commissioners were informed of the promotion of this Bill in July, 1924. A copy of the Bill was handed to them at the same time as it was deposited in the Parliament Office, so that the Commissioners might know of the intended promotion, and follow the usual course, which was to defer consideration of the Order until Parliament had considered the Gas Company's Bill. The Gas Company objected to the Order, but they were not heard by the Commissioners in support of their objection. The Commissioners granted the Order and forwarded it to the Minister of Transport for confirmation. Lord Clarendon then read the following quotation from a member of the Commons Committee when the Bill was being considered there.

"There seems to be a contest here between the Electricity Commissioners and the Houses of Parliament as to who shall be able to decide between these two competing authorities on this particular Bill."

He added that the Committee over which he presided, after a hearing which lasted four days, gave the Gas Company their Bill.

Dealing next with the inquiry by the House of Commons Committee, Lord Clarendon stated that both the schemes were examined, and after a hearing lasting for three days the Gas Company's Bill was rejected. In view of the course he was asking their Lordships to take, he desired to give a few more facts regarding the proceedings before the House of Commons Committee. Under the Standing Order of Parliament, the Minister reported to Parliament upon the powers sought, and that report stood referred to the Committee appointed to hear the Bill. The Minister also had to perform a judicial function on every Order sent him; and that power was granted under the new Electricity (Supply) Act, 1925. If a memorial was lodged by any of the opponents, the Minister had to direct an inquiry to be held. But the terms of the Minister's report undoubtedly indicated a desire on his part that the Committee should uphold the Commissioners' Order. Whether the report did or did not influence the Committee, it was impossible to say; but he ventured to suggest there was an absence of the judicial spirit in which the Minister desired anybody who held an inquiry should approach the subject. The Gas Company naturally felt they were placed at a great disadvantage by the terms of the Minister's report, and that no good purpose would be served by appearing upon their memorial and being heard. He might point out that the Gas Company had, therefore, been precluded from stating their case before either of the two subordinate tribunals, and they felt that they had no alternative but to concentrate upon the Bill now before Parliament. Although the Minister reported to Parliament that the Commissioners were satisfied with the practicability of the technical scheme as submitted by the Electricity Company, and the promoters informed their Committee that they had explored in vain the possibility of a bulk supply before the House of Commons Committee, the promoters at the last moment threw over the scheme approved by the Electricity Commissioners, and submitted a proposal for a bulk supply with the County of London Electricity Supply Company, whose nearest main was eleven miles away.

The final point made by Lord Clarendon was to the effect that, if this Order was agreed to, he thought it would be assumed by outside sources that their Lordships agreed with the policy upon which the Electricity Commissioners' policy was based. As they were probably aware, under the new Electricity (Supply) Act, 1925, statutory gas companies were now empowered to apply for Orders to supply electricity; and he thought they would certainly wish to know how they stood under this procedure. Gas companies had a right to expect that whatever undertakings they placed before committees, or before the Electricity Commissioners, should be considered on their merits as business propositions. He suggested that the only safeguard in regard to these matters consisted in allowing Parliament to retain control over the granting of Orders. If this Order was rejected, he could give an undertaking, on behalf of the Gas Company, that they would promote a Bill on the same lines next session.

Lord Gainford said he did not want for a moment to suggest that the mover of the amendment was actuated by anything like obstructive tactics—far from it. But he (Lord Gainford) wanted to point out that the Gas Company's Bill was now dead. The Order before the House had passed all the tribunals which Parliament had appointed for the consideration of a matter of this kind, and, having passed the House of Commons Committee, was now up for ratification; and within six months, if the Order was passed, the people in the locality would not only have a bulk supply of electric light and power, but would be in a much better position than they possibly could be if the amendment suggested was accepted. In that case Lord Clarendon had promised that another Bill would be brought in next year in order to deal with this subject *de novo*. This meant that the whole of the expense incurred by the people in this locality, some in favour of an electric supply company, others in favour of the Gas Company, would be incurred again, and then possibly the matter might be once more deferred. On the other hand, in the event of the motion being accepted, the population would be able to secure their electric light on the cheapest terms available, and the supply would be of a very satisfactory kind. The natural inclination of all must be to support the tribunal of the House which had apparently investigated these things. But it should be pointed out that in March last there were two private enterprise concerns. "Do not (said Lord Gainford) let us trouble about which had priority in promoting this particular proposal of a generating station in Horley. It is not that question which is of importance; it is a question of which is the better proposal—the one which was before the House of Lords Committee last March, or the much larger one which came before the House of Commons Committee two months later." The Barking station had now got mains within four miles of the area of supply. In the next few weeks an Order would be secured for the County of London Authority to continue its main up to the very area of the Horley district. The House of Commons Committee had before them the proposal of a bulk supply for this community, instead of the comparatively small generating station which was going to be erected at Horley. It seemed to him that they had merely to decide what was really in the interests of the community which these two rival concerns desired to serve.

The Earl of Donoughmore remarked that there was no bulk supply or generating station in the Order.

Lord Gainford (continuing) said the fact remained that there was a bulk supply available to the community if they liked to take it and if their Lordships cared to enable the community to have it

Viscount Haldane said the whole question was whether the bulk supply scheme was not by far the best for this particular locality in Surrey. To confine it to a small local company supplying gas as well as electricity was to leave it exposed to the very thing of which it had been the policy of successive Governments to get rid. He would be glad if Viscount Peel (who represented the Ministry of Transport) would inform them in his reply whether it was or was not the fact that the contemplated Gas Company's Bill did supply a larger district than the Order, and whether it was true that the Order merely picked out, as he understood, the "plum" of the district and left the outlying people unsupplied. If this was so, he did not see how, on the whole, it would be an advantage to Horley to have a smaller Order. He did not understand why they were to approve of an Order providing for a generating station, and to have it understood in some way that it meant a bulk supply. This seemed to him an excellent reason for rejecting the Order in the form in which it was before them. There seemed to have been changes of front on the part of the promoters of this electricity undertaking, and there seemed to have been a decision of the Lords Committee, after a careful hearing, in favour of the Gas Company. He hoped that they would at any rate assert the fact that the ultimate control rested with Parliament, by not passing the Order, which had been prepared not by any Parliamentary body, but merely by those bodies to whom Parliament had delegated the business of examining these things in the first place, and bringing them up in a complete form.

Lord Hindlip said that as far as he could gather only two objections had been raised. One was by Lord Gainford on the ground of expense. But had it not been for the opposition, surely the Gas Company would have had their Bill, and by next June would have been supplying electricity. The other point raised was as to the bulk supply. This bulk supply was, of course, something new to anything heard during the Committee stage. But as far as he could see there was no reason why this bulk supply should not be given through the Gas Company instead of through the Electricity Company. Further, the area under the Order was considerably smaller than the area under the Gas Company's scheme. In this matter the Department had been rather apt to consider themselves in a position to usurp the powers of the Houses of Parliament——certainly the powers of this House, which he felt sure they were very jealous to preserve.

The Chairman of Committees (Earl of Donoughmore) said that at the inquiry before the Electricity Commissioners the Gas Company were not summoned, though their case on paper was heard. To the second inquiry (the Ministry of Transport inquiry, as opposed to the Electricity Commissioners' inquiry), the Gas Company were invited to come and state their case, but the Company (he thought rightly) said they would not, because they had had a decision of the Committee of the House of Lords, and the Ministry of Transport was not a Court of Appeal from a Committee of this House. He considered the Gas Company were right in refusing to take any further part, relying on the protection they would receive as a result of this debate. Primarily, of course, this was a disagreement between a Committee of this House and the Ministry of Transport; but a much more important matter than this, as the debate had made clear, was that it was a disagreement between the two Houses of Parliament. Lord Clarendon pledged himself, in the event of this Order being refused, that the Gas Company would reintroduce their Bill. He understood that under the Standing Orders the proper notices for the Bill had already been given with a view to its deposit on Dec. 17. He also understood that the Bill was already in print. He would like to suggest that the motion should be withdrawn, and that the question of the disagreement between the two Houses should be decided in the only way that it could be decided—namely, by referring the Order and the Bill, when introduced, to a Joint Committee of the two Houses in the early spring. He would, of course, undertake that everything he could do should be done to bring the inquiry on as early as possible. He was reluctant to make this suggestion for two reasons. He felt that it would increase the expense in a matter which was not a great one from the point of view of bulk in comparison with the schemes considered by their Lordships, though it was of great importance to the parties immediately concerned.

Viscount Peel said what had happened partly arose from the fact of the double procedure—procedure by Bill and procedure by Special Order. The Chairman of Committees had made the suggestion that the Order should be withdrawn or rejected, and that two Bills should be promoted next year.

The Earl of Donoughmore: I suggested that my noble friend should not press this Order now. It could remain on the paper, and the Order, together with the Bill, could be referred to a Joint Committee.

Viscount Peel: When?

The Earl of Donoughmore: Early next session.

Viscount Peel: I am going to ask your Lordships not to take any such course, but to pass the Order at once.

The Earl of Clarendon said that he must press the matter to a division.

The Marquess of Salisbury stated that he did not wish to rush their Lordships if there was a desire to have a little more time. If the matter went to a division, the Government would, of course, support the Ministry of Transport.

Lord Parmoor thought they should accept the suggestion of the Lord Chairman. This not only provided for delay, but allowed the whole judicial atmosphere to be reinstated on a proper basis. He did not know whether it was in order for the Lord Chairman to propose as an amendment what he had brought before them.

The Marquess of Salisbury suggested that it would be much easier to decide upon the Lord Chairman's suggestion if they had a day or two in which to consider it.

Earl Beauchamp moved that the debate be adjourned till Tuesday, Dec. 15, and this was agreed to.

Alderman's Alleged Indiscretion.

In a special report to come before the Walsall Town Council, the Corporation Gas Committee state they were informed by the Deputy Town Clerk that on March 4 last a report was made to him by the Gas Engineer that Alderman Warner (then Chairman of the Gas Committee) was having certain of his property repaired by the gas-works staff under the supervision of the Works Superintendent, and without his (the Engineer's) knowledge. Instructions were given for an account to be rendered by the Gas Department to Alderman Warner. This was done on March 9, and was paid by him at once. He expressed to the Committee his regret at any irregularity which had taken place, and stated that the work was done without concealment. The Committee passed several resolutions, one of which was that they were of the opinion that Alderman Warner did not act with any dishonourable motive, but that he had behaved in an indiscreet manner.

Power Gas Corporation.—The Directors, in their annual statement, record a profit of £12,315, out of which they have appropriated to the reserve fund £2000. The balance brought forward from the previous year was £21,268. It is proposed to pay a dividend of 4 p.ct. per annum, less income-tax, which will absorb £11,985, leaving a balance to be carried forward of £19,599.

Lincoln Gas Exhibition.—Mention was made on p. 607 of the "Journal" for Dec. 2 of a gas exhibition at Lincoln. It may be added that the following apparatus manufactured by General Gas Appliances, Ltd., of Guide Bridge, Manchester, was included in the exhibition: "Dainty," "Raised Level," and "Dainty Senior" cookers, and "Cheeru," "Jannock," and "Gradely" gas fires.

H. E. Jones Memorial Institute.—In the "Wandgas Magazine" (the Journal of the Wandsworth, Wimbledon, and Epsom District Gas Company) for November is an account of the H. E. Jones Memorial Institute, which is close to the Wandsworth Works. It was acquired from the Metropolitan Water Board. The main building has already been converted into a concert and lecture hall; and there is a recreation and billiards room.

Co-Partnership at Bishop's Stortford.—The annual dinner of the Bishop's Stortford, Harlow, and Epping Gas and Electricity Company's co-partnership employees was presided over by Mr. E. L. Burton (the Chairman of the Company), who said the scheme dated back to January, 1922, and at the present time each co-partner who came into it at the beginning had standing to his credit the sum of £22 10s. 11d. In addition, the Directors had laid themselves out to give the highest wages paid by a gas undertaking of their scale; and it was hoped to pay an even higher wage. Within reason, it was the desire of the Company to pay as high a wage as was possible. The Company had to-day 100 regular employees, and 92 were co-partners. Seven others were awaiting the completion of one year's service to become co-partners. There was at present £2550 worth of stock to the credit of the co-partners. Sir Harry Goschen and Mr. E. B. Barnard (Chairman of the Herts County Council) spoke in favour of co-partnership, and were thanked for their speeches by Mr. F. H. Jones. The Directors were also heartily thanked for their entertainment; and Mr. Price, who was retiring on pension after 38 years' service, was presented with an armchair, which gift had been subscribed to by everyone in the Company.

LEGAL INTELLIGENCE.

HELPS v. OLDHAM CORPORATION.

HIGH COURT OF JUSTICE.—CHANCERY DIVISION.

Tuesday, Dec. 8.

An action relating to inventions for the use and production of gas was opened before Mr. Justice LAWRENCE in the Chancery Division, on Tuesday, Dec. 8. Plaintiff was Mr. George Helps, Gas Engineer and Inventor, who is General Manager to the Nuneaton Gas Company. Defendants were the Oldham Corporation. Plaintiff asked for an account of royalties which he alleged to be due for the use of an invention under a license dated June 4, 1919, damages for alleged breach of a contract dated April 29, 1918, relating to the use of certain ideas and information which the plaintiff communicated to the Corporation, and also for an injunction to restrain the Corporation from using these ideas anywhere but at their Higginshaw Works. The Corporation counterclaimed for damages on the ground that under the agreement of June 4, 1919, the plaintiff guaranteed that certain producer gas plant should be capable of a named output, which in fact it was incapable of producing

Mr. WHITEHEAD, for the plaintiff, said that his client was a gas engineer, and had been a prolific inventor. Engaged in the consideration of problems connected with the economic utilization of coal gas, he saw there was every possibility of economy in employing gas of such a grade that little secondary air was needed for complete combustion. The idea was that, instead of supplying high-grade gas, use should be made of a lower-grade gas, in order that completer combustion might be obtained by mixture with primary air. With high-grade gas, a coneless flame could not be secured except by greater pressure or a special burner. After Mr. Helps appreciated the importance of obtaining a coneless flame, he studied flames with great thoroughness, and engaged an artist to observe coal fires, gas fires, and bunsen burners, and to commit what he saw to paper. The result of this and Mr. Helps' own experiments was his decision that what was wanted for domestic economy was a coneless flame from a low-grade gas. Thus he would get high-pressure efficiency from a low-grade gas, even though he employed the latter at ordinary pressures. For this purpose he devised a special burner. The present dispute centred in part round this new burner. At the head of the burner there was a cone valve which fitted in a conical seating; and the consumer could regulate both the air supply and the gas supply. The low-grade gas passed along a pipe in the ordinary way, air was introduced by reason of injector action, and the mixture emerged through the conical valve. When the burner head was adjusted to give an annular opening of considerable magnitude, there was a ready passage for the mixture. By enlarging or constricting the outlet, the resistance to the passage of the mixture was lessened or increased, and the actual composition of the mixture was modified by alterations in the injection of air.

The other main dispute in the case related to gas producing plant. It was a curious fact that, until a special dispensation was granted by Statute, gas engineers were unable to supply low-grade gas to the consumer.

Sir ARTHUR COLEFAX, K.C., for defendants: The Board of Trade implored gas engineers to supply low-grade gas, in order to save coal.

His LORDSHIP: But they did not implore the gas companies to charge a higher price.

Mr. WHITEHEAD: The imploring to supply low-grade gas was only done after the Board of Trade had been taught their job by the plaintiff.

Sir ARTHUR COLEFAX: That is an amusing idea.

Mr. WHITEHEAD (proceeding) said that, after gas had been made by the distillation of coal, the residual coke might be treated with steam, or steam and air, and this produced a further supply of mixed gases. It was also possible to manufacture large quantities of mixed gases by the complete gasification of the coal.

The plant around which part of the dispute arose in this action was a unit installed at the defendants' Higginshaw Works. It included means for dealing with the incandescent coke by hot air and steam sucked through the mass. This plant was of the suction producer type. Above the suction generator was a retort. Coal was filled into this; and the hot gases made in the producer passed upwards and round the retort, which was situated above the producer. As a result straight gas was generated in the retort, with a calorific value of rather more than 600 B.Th.U. per c.ft. The coke was allowed to fall from the retort into the producer below, and was there subjected to producer gas reactions. Thus gasification took place in two stages.

His LORDSHIP: Then you have a mixture of all sorts of things. You obtain the straight gas, and you mix with it the diluents. How do you get the gas of high calorific value?

Mr. WHITEHEAD: It passes off from the retort. I believe the rich nature of the gas arises from the temperature of carbonization.

His LORDSHIP: You draw-off the gases separately?

Mr. WHITEHEAD: Yes. They are mixed later according to the grade required. Mixed together, the whole product gives a gas the calorific value of which is about 160 or 170 B.Th.U.

Proceeding, Counsel said that Mr. Helps also devised a hotplate to minimize the waste of heat which under the older systems was carried away by the bars. It was in this state of affairs that the agreement of April, 1918, was arrived at with the Oldham Corporation. It was made in the form customarily used by gas authorities in the kingdom. It bound the Corporation not to disclose the inventions to others, and not to employ them unless and until a subsequent agreement was entered into. When that form of agreement was first drafted, not one of the provisional specifications for plaintiff's inventions had been accepted. But by April, 1918, one of them had become an accepted specification; and this was a matter relied on by the defendants in their defence.

His LORDSHIP: What is the result of that?

Sir ARTHUR COLEFAX: I say they did not communicate any secrets to us at that time.

His LORDSHIP: What claim do you base on that?

Sir ARTHUR COLEFAX: If they were not secrets, plaintiff cannot have damages for our disclosing or using what he claimed to be secrets.

Mr. WHITEHEAD read the specification of the patent which was accepted before the date of the agreement.

His LORDSHIP: What is the invention in that?

Mr. WHITEHEAD: It is the disclosure to the public that a gas can be made which has a low calorific value, and that this gas has uses never appreciated before the date of the patent.

His LORDSHIP: Is that a patent for an idea or for an apparatus?

Mr. WHITEHEAD: It is for the manufacture and use of a particular gas. It may be that the inventive step is the discovery of the gas and the realization of the uses to which it should be put. The merit of Mr. Helps' inventions was that they could be put into operation at the ordinary gas pressure. The specification itself was published in the "GAS JOURNAL."

Sir ARTHUR COLEFAX: And also in the "Gas World."

Mr. WHITEHEAD remarked that there was a subsequent agreement made in June, 1919, which provided for tests to be made at defendants' Higginshaw Works. Plaintiff complained of the employment of the inventions at two other gas-works. He said the use at these other works came within the license agreement of June, 1919, and was subject to the royalties therein provided. If it did not come within that section, plaintiff said it was a breach of agreement not to use the inventions without a subsequent agreement.

Wednesday, Dec. 9.

Mr. WHITEHEAD said that after the Higginshaw plant had been in operation some months, the first complaints about its productive capacity were made.

His LORDSHIP: What is your suggestion about the Oldham working?

Mr. WHITEHEAD: It is that, after they had tried the apparatus with coke for some time, they decided to produce a gas of about 200 B.Th.U. per c.ft., and the plant was not specifically intended to produce such a gas. Also, they used a coal which caked, and the exhausters were not powerful enough to create sufficient suction through such material. But we say that the plant did accomplish the guaranteed minimum of 20 million B.Th.U., and that on such occasions as it failed to do so, it was not due to any fault of the plant.

His LORDSHIP: I thought you said the exhausters were not powerful enough.

Mr. WHITEHEAD: They were not part of the plant we supplied.

Mr. *George Helps*, the plaintiff, said he had been engaged in the gas industry all his life. Up to 1916 the gas supplied to consumers in this country was between 520 or 530 and 600 B.Th.U. A low-grade gas was below 450 B.Th.U. Various experiments made in his study of flames led him to see the advantage of aeration. Witness said he first made experiments with low-grade gas in 1915 and 1916. He was never able to obtain a coneless flame with an old-style burner, even with low-grade gas. This was because he could not get complete combustion in one stage. Low-grade gas had advantages which even the gas industry itself had not fully realized. It gave more rapid combustion and a hotter flame. By the use of his burner, a vessel was able to be brought nearer the burner.

Thursday, Dec. 10.

Mr. WHITEHEAD: In preparing low-grade gas, does it matter what the manner of manufacture is so far as the duty obtainable is concerned?

Mr. *Helps*: Yes.

COUNSEL: Has the presence of nitrogen as an inert any deleterious effect on low-grade gas?

Witness: Anything up to 30 p.ct. has no deleterious effect, and is in some cases an advantage.

COUNSEL: Wherein lies the advantage?

Witness: Owing to the ability of the nitrogen to carry-in air for the more complete combustion of whatever gas is being used.

Do you mean by reason of injector action?—Yes.

COUNSEL: Consider the cost of manufacture in terms of cost per B.Th.U. Is it cheaper to manufacture high-grade gas or low-grade gas?

Witness: Low-grade gas is about one-third the cost, if it is made by the complete gasification of coal in one stage.

Witness stated that the "Pleno" plant at Higginshaw was completed in September, 1920. But before then Oldham consumers had been supplied with low-grade gas—of a calorific value of about 400 B.Th.U.—and his burners and appliances were being used. If the Higginshaw plant were worked with coke, he would expect to get 20 to 22 million B.Th.U. to the ton. With coal he would expect 22 to 24 million B.Th.U.

Mr. WHITEHEAD: It is suggested that the Higginshaw plant will not give 15 million B.Th.U. per ton of coal.

Witness: That is absurd.

Witness stated that on Jan. 7, 1922, he read a paper at Manchester; and at that meeting Mr. Duxbury stated the results of working at Oldham. Mr. Duxbury's figures were reproduced in the "GAS JOURNAL" for Jan. 1, 1922.

Sir ARTHUR COLEFAX: How can this gentleman say what the figures were?

Mr. WHITEHEAD: Have you taken the "GAS JOURNAL" week by week?

Witness: Yes.

Have you kept copies as it has come out?—I have.

His LORDSHIP: Is it an accurate record of the speech?

Witness: Most accurate.

Witness explained the test—by which between 18 and 19 million B.Th.U. were obtained from the Higginshaw plant—by saying that on that occasion caking coal was used, and the Higginshaw plant was not designed for this material.

Sir ARTHUR COLEFAX proceeded to ask questions with regard to "Selas" gas referred to in a paper by Mr. H. T. Cotton, published in the "GAS JOURNAL" for March 26, 1918.

Witness agreed that the "Selas" system was one under which a mixture of air and gas was prepared for ultimate burning.

COUNSEL also asked questions relating to alleged disclosures of Mr. Helps' ideas made by Mr. Cotton in the same paper.

Friday, Dec. 11.

Mr. *Helps* was further cross-examined with regard to the paper by Mr. H. T. Cotton, published in the "GAS JOURNAL" before the start of his negotiations with the Oldham Corporation. He agreed that this article disclosed a number of things which he claimed to have disclosed to the Oldham Corporation under his agreement. It was incorrect to say that low-grade gas necessitated the employment of larger gas mains, though at one time he thought it might.

Sir ARTHUR COLEFAX: You admit that the gas industry generally thinks that larger mains are necessary?

Witness: I do.

Your position is that you remain in this condition of mental superiority?—Mental, no; practical, yes.

Plaintiff said that before his inventions there was ignorant use of gas flames, which he had now largely removed. At the time of his specification he believed there was no man in the gas industry who could tell what a coneless flame was. He admitted that the specification disclosed other things which he had claimed to be secret and novel at the time of his first agreement with the Oldham Corporation. But neither the paper by Mr. Cotton nor the specification No. 111,495 for the manufacture and use of low-grade gas disclosed his burner, the method of adjustment, the system of manufacture of the gas, or its effect on mains, meters, and consumers' fittings.

Sir ARTHUR COLEFAX: In no case—with the single exception of one fortnight during the coal strike—do the figures for gas at Oldham fall as low as 335 B.Th.U. per c.ft., although in these works they are mixing blue water gas with straight gas. Before they had any communication with you, the Corporation of Oldham were dropping the calorific value of gas they were supplying?

Witness: That is so.

COUNSEL: For several years before May, 1918, it had been the tendency of the gas industry to reduce the calorific value of the gas supplied?—From the end of 1916, I should say.

In fact, the Board of Trade were pressing gas companies to reduce the calorific value of the gas they were supplying, with the object of saving coal?—Undoubtedly.

For the year ended March, 1923, and thereafter, Oldham has been working to an average of 450 B.Th.U. gross, or rather more?—Yes.

So far as 450 B.Th.U. gross is concerned, it was an idea many people had before you, as being a desirable calorific value for gas?—I have not heard of it.

COUNSEL: Have you ever heard of Mr. West?

Witness: Yes.

Did he say in your presence that he had that idea?—He may have done so.

The question of what was the ideal calorific value was much debated for years before 1919?—Yes.

Different people held different views?—Yes.

Mr. West was advocating gas of a calorific value of about 450 B.Th.U.?—Yes, but without reason.

COUNSEL: Before 1918 there were many people who were advocating 450 B.Th.U. gas?

Witness: Yes.

COUNSEL: And that appears to be the figure upon which Oldham have settled?

Witness: Yes.

MISCELLANEOUS NEWS.

GAS REGULATION ACT APPLICATIONS.

There have appeared in the "London Gazette" the following notices regarding applications to the Board of Trade under the Act.

DECLARATIONS OF CALORIFIC VALUE.

Corsham Gas Company, Ltd.—540 B.Th.U., in substitution for 500 B.Th.U. (March 31, 1926.)

Harrogate Gas Company.—460 B.Th.U., within the added area—the parishes of Dacre, Hartwith-with-Winsley, Bewerley, and High and Low Bishopside. (July 1, 1926.)

TORBAY PAINT.

From Partnership to Limited Company.

We are advised that the old-established partnership of the Torbay Paint Company (proprietors, Stevens & Co.), sole manufacturers of Torbay paint, has for family reasons been converted into a Private Company under the style of the Torbay Paint Company, Ltd. The late partners, Messrs. S. Freeman Burrows, Henry L. P. Allender, and G. Arthur Stevens, will continue their association as Directors.

Torbay paint has been established for the past eighty years, is well known to all gas engineers, and as a result finds its way into an extremely high percentage of the gas-works of the United Kingdom and abroad. Readers of the "JOURNAL" will join us in congratulating the old firm on this satisfactory development of their business.

LIVERPOOL GAS FOR WOOLTON.

Subject to the sanction of the Board of Trade, the Liverpool Gas Company will acquire the undertaking of the Woolton Gas Company in July next year, and extend their area of supply so as to include the Woolton limits and the parish of Speke. A Draft Order to this effect was approved by the Liverpool Company's shareholders at a special meeting on Dec. 9.

In consideration for the transfer, said Mr. H. Wade Deacon, the Chairman, it was proposed to issue the ordinary stock of the Liverpool Company to the holders of the Woolton stock in such amounts as would enable them to receive the same dividends as at present. There was a clause in the Order which enabled them to charge a higher price for gas in the new area. Arrangements were being made with the Liverpool Corporation by which, in the Woolton district, the price might for twenty years exceed by not more than 3d. per therm the price charged in Liverpool; and in Speke it would be not more than 4d. in excess of the Liverpool price. The Company were also seeking borrowing powers up to one-half of their ordinary stock, instead of one-third as at present, and were asking for powers to contract with any local authority, or company, or person, for the supply of gas in bulk.

A shareholder asked whether it was the intention that the Woolton Gas-Works should be scrapped.

Mr. WADE DEACON said they would probably be able to make all the gas required without using the Woolton Works.

CONSUMERS' GAS COMPANY OF TORONTO.

Annual General Meeting.

The Seventy-Seventh Annual General Meeting of the Company was held in Toronto on Nov. 16—Mr. A. W. AUSTIN (the President) in the chair.

The CHAIRMAN said that the report for the year ended Sept. 30 was a very gratifying one in every respect. The capital investment was amply protected by reserves equal to about 71·31 p.ct. of the amount paid up. He knew of no other public utility company of any size on the Continent of America whose financial position was equal to that of the Consumers' Gas Company of Toronto, in that the Company had no financial obligations other than to the shareholders. The very best methods of gas production were employed, and the system of distribution was being constantly improved. The total revenue from gas sales for the year was $5,079,433, and of this they paid out in wages 42·7 p.ct. The demand for gas continues to increase; the net gain in the number of consumers during the year being 4266.

The GENERAL MANAGER (Mr. Arthur Hewitt) stated that, while in the past decade the total production of gas had doubled, the consumption of gas for industrial purposes had increased tenfold. He pointed out the advantages of this business, and the fine prospect for future development. He also made reference to the inauguration of the Home Service Department, which has for its object the cultivation of closer relations with home-makers.

The resolution for the adoption of the annual report was carried unanimously.

South Suburban Gas Company.—The support given by the Directors and officers of the Company to the sports in which the employees take part is greatly appreciated by the men, as was demonstrated at the annual dinner of the Bromley Works Social and Athletic Club, which was held on Wednesday, Dec. 9. The Chairman, Mr. W. M. Judd (Hon. Treasurer of the Club), was supported, among others, by Mr. J. Terrace (Chief Engineer of the Company), Mr. F. G. Gorman, and Mr. J. K. Grant (Assistant Superintendent, Bromley Works). Mr. Terrace remarked that the Directors wished to do all they could to foster the spirit of sport among the employees, because they believed it would help to make them not only better workmen, but better men.

TRAGEDY AT PADIHAM.

On Thursday, Dec. 10, three young women were found fatally gassed at No. 28, North Street, Padiham.

At the inquest, Mrs. Fisher, of 15, East Street, said that her home was about three yards away from No. 28, North Street. On Wednesday morning, while placing cakes in her oven, an explosion occurred, which, however, did no damage. She had no smell, but had been informed there was a strong smell of gas. Consequently she laid information at the Council offices, at 12.15, asking them to attend to the matter at once. As no one had called at 3 p.m., she again went to the offices.

Mr. H. W. Dean, Gas Manager to the Padiham Urban District Council, said that the first intimation he got of the complaint was at 3.30 p.m. at the gas-works. Immediately he received the complaint he told James Coulson, a main and service layer, to go to the job. At five o'clock, said Mr. Dean, he and the foreman, Fred Satterthwaite, went to East Street. There was a smell of gas at No. 15, but not at No. 34. He told the tenants of these two houses to keep their windows open, for safety. When he left, he felt there would be absolutely no danger.

James Coulson said that, on receiving the Manager's orders, he went at once to East Street. There was a smell of gas at No. 15, but none inside No. 34. He could not trace the smell; and as it was dark, he decided to leave the work until the following day. The week before, added witness, there was a leak at the bottom of the street, and this took four days to find. On Thursday morning the leak was discovered at the gable-end of No. 28, North Street.

P.C. Harks said that the police received a message at 5.15 a.m. on Thursday, and he went to No. 28, North Street. The three girls were in bed, apparently dead. Artificial respiration was tried until Dr. Bromley arrived, who pronounced life extinct. The chimney of the bedroom was choked up. The capacity of the room was 869 c.ft.

Mr. J. C. Waddington, who appeared for the Padiham Council, remarked that the legal minimum was 300 c.ft. per person.

The jury returned the verdict that the girls died of suffocation caused by gas in the bedroom, and that the absence of ventilation contributed to their death.

MINERS AND NATIONALIZATION.

The second portion of the evidence of the Miners' Federation before the Royal Coal Commission was given on Thursday, Dec. 10, when Mr. S. O. Davies (Vice-President of the South Wales Miners' Federation) and Mr. Frank Hall (Secretary of the Derbyshire Miners' Federation) appeared before the Commission. Their evidence consisted of a long series of charges against the management and general efficiency of the mines in the country as a whole; and it was intimated that subsequent witnesses will be put forward who will propound a complete scheme for the nationalization of the mines, and the improvement of their efficiency, coupled with a clear statement as to what it is thought should be the relationship between the collieries of the country and the large coal-consuming industries—such as the gas industry, the iron and steel industry, and so on. For this reason, both Mr. Davies and Mr. Hall expressed a desire not to go beyond the statements in their evidence as to the alleged inefficiency and mismanagement of the mines under private control.

Mr. EVAN WILLIAMS (for the coal owners) characterized the statements of these two witnesses as a repetition of the vague charges which have been made ever since the campaign for nationalization was begun, and said that, in consequence, he would not question the witnesses in detail.

Mr. HERBERT SMITH (for the Miners' Federation) strongly resented this statement on the part of Mr. Williams, and said that he would bring evidence from almost every colliery in the country to prove the allegations of inefficient working, if it took him two days to do so. Subsequently, he proposed taking cases in detail, to prove the statements made.

The CHAIRMAN, however, thought too much time would be taken up by following this course.

During the course of a long discussion on the matter,

Mr. HERBERT SMITH suggested that if the miners were prevented from proving their case in this way, they might have to withdraw from the inquiry.

The CHAIRMAN said that the position could quite well be met by the miners sending in to the Commission a detailed statement of the facts upon which the general allegations in the evidence of Messrs. Davies and Hall were based.

Mr. *Davies* said that, in the scheme which the miners would put forward later, the whole question of the management and technical working of the mines would be dealt with, in addition to the question of nationalization.

One important point dealt with in the evidence placed before the Commission on Dec. 10 was that the large coal-consuming industries are making undue profits at the expense of the coal industry. In addition to alleging that the bye-product industries and the iron and steel industries are closely identified with the coal industry, and have coal supplied to them at prices below the pithead prices, due to the fact that colliery directors are also directors of these other companies, it was stated that the profits made by the gas and electricity supply companies make it clear that these industries, which use coal on a large scale, are in an exceptionally prosperous condition—benefiting by the low prices of coal and the low wages of the miners, while at the same time fleecing the consumers of heat, light, and power produced from the coal. Many of these concerns, it was stated, have direct connections through overlapping directorships with the colliery companies; and the miners consider that the contracts for the sale of coal to these companies are constantly favourable to the gas and electricity supply concerns and unfavourable to the coal producers. To sum up, it was claimed that the colliery owners have found modern developments in the use of coal of great assistance to themselves in avoiding prosperity in the coal-raising industry, in order to encounter it at other stages of the coal-using industries.

NORTH-EAST COAST COAL TRADE.

From our Own Correspondent.

The week closed with a strong tone in all sections. There is little coal unsold for the rest of the year, and, with better arrivals of tonnage recently, the prompt position is good.

Inquiry all round has been plentiful, and, as a result, collieries are anticipating strong markets and better prices for the early part of next year, though merchants report that Continental business is only obtainable in strong competition with other sources of supply. Forward business is considerably handicapped by the uncertainty prevailing as to what will happen at the end of the subsidy period. Collieries are unwilling to contract beyond this, which is only natural, considering they are barely making ends meet even with the subsidy of three to four shillings a ton. A good deal of inquiry is for the whole of 1926, and collieries are unable to offer for this period.

Apart from this, prospects are considered good for continuance of regular trade. Prices have not moved much; but the tone has improved in the last week. Northumberland steams have been better, and quotations have hardened slightly. In the Durham section, Wear Specials are nominally 16s. 9d. to 17s. f.o.b., and best qualities quote steadily at 16s. 6d. Seconds are firm at 15s. 3d. to 15s. 6d. Coking sorts are well booked at 15s. to 15s. 6d Unscreened bunkers are strong, and best sorts scarce at 16s. 6d. to 17s.

The demand for coke continues; but supplies are small, and trade is consequently restricted. Gas makes are 24s. 6d. to 25s. f.o.b.

YORKSHIRE AND LANCASHIRE COAL TRADE.

From our Local Correspondent.

The gas coal market in Yorkshire and Lancashire is fairly firm, with deliveries moving freely under contract, although with some of the secondary qualities there is no difficulty in respect of supplies in the open market.

There are the usual extra orders for household coal in the market for delivery before Christmas, and although there is no great shortage of fuel there is some slight delay in the prompt execution of orders. Prices are inclined to be firm, with some of the cheaper qualities being brought more into line with the average winter figures.

There appears to be a more optimistic tone among industrial consumers, with the result that the better grade fuels are firmer; but some of the commoner qualities are not in great demand. During the past few months it has been apparent that manufacturers are becoming convinced that washed coals are of greater economic value than the lower-priced dry fuels.

The export section shows that washed smalls, washed doubles, and hards have appreciated in value, but that this position is created by the exporters and not by the increased demand, with the consequent higher prices, from abroad.

Collieries report a general shortage of wagons, and one or two pits have had to close down pending the arrival of empties.

The following are the Humber bunker and export prices (f.o.b. usual shipping ports): South Yorkshire.—Hards, Association, 19s. to 19s. 4½d.; screened gas coal, 19s. 6d.; washed doubles, 20s. to 21s.; washed singles, 18s.; washed smalls, 15s. 3d. to 15s. 9d.; rough slack, 10s. to 10s. 6d.; smithy peas, 19s. 6d. to 20s. 6d. West Yorkshire.—Hartleys (f.o.b. Goole), 17s. to 18s.; washed doubles, 17s. 6d. to 18s.; washed singles, 17s. to 17s. 6d.; rough slacks, 10s. 6d.; coking smalls, 10s. to 10s. 6d. Derbyshire and Nottinghamshire.—Top hards, 19s. to 20s.; washed doubles, 18s. to 18s. 6d.; washed smalls, 13s. 6d. to 14s. 6d.; rough slack, 9s. 6d. to 10s. 6d. Yorkshire, Derbyshire, and Nottinghamshire.—Screened steam coal, 17s. to 18s.; gas coke, 24s. to 26s. 6d.; furnace coke, 20s. to 21s. per ton.

COAL TRADE IN THE MIDLANDS.

From our Local Correspondent.

The tension arising from the increased strain upon inadequate transport has not been relieved. Climatic conditions have been more favourable on the whole, however, so that serious stringency has been averted. Whereas the congestion was at the terminals down to a month or so ago, it is now at colliery sidings and railway junctions. Immediately available stocks have been greatly reduced. During the past week some collieries have further advanced their prices for certain descriptions of house coal, which are well sold. The increases range from 6d. to 2s. There is a general tendency for house coal to appreciate in retail transactions. Industrial grades are not affected to any material extent. The output of these is equal to demand. If there is any shortage it arises from delays in the distributive channels.

Steams are firm at late rates, so far as most grades are concerned. The hardening tendency of double screened nuts is still a distinguishing feature. Slacks are moving off well. As much as 17s. and 18s. at oven has been paid for blast-furnace coke, but not for smelting purposes. Its use for heating continues to grow. Consumers regard it as a good proposition in comparison with gas coke, the delivered price of which is 37s. in Birmingham.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *Dec.* 14.

The market for pitch continues steady, and it is stated that in some directions over 50s. per ton has been paid.

Creosote is steady and unaltered at 7¼d. to 7¾d. per gallon net and naked at makers' works.

Other products are steady at the values recorded last week.

Tar Products in the Provinces.

Dec. 14.

Tar products have been firm throughout the past week.

Pitch has improved, and 55s. is probably obtainable f.o.b. United Kingdom ports for January/March shipments. It would still appear, however, that the bulk of the sales which have been made to date are to dealers, as there is no satisfactory evidence that fuel manufacturers have purchased any considerable quantity at the advanced prices.

In creosote the market is firm, and prices for both home and export are well maintained.

Water-white products are well maintained.

Full prices are being offered for benzole for delivery over the first six months of next year, while the rubber manufacturers are booking solvent for delivery over the first six months of next year at round about to-day's market prices.

Crude carbolic acid is quiet. A certain amount of purchasing is being done by Continental consumers at equal to about 1s. 3d. makers' works, England.

Cresylic acid is firm, and there is a good demand, particularly for special grades.

Naphthalene is still very depressed, and anthracene is practically unsaleable.

The average values for gas-works products during the week were: Gas-works coal-tar, 37s. 3d. to 42s. 3d. Pitch, East Coast, 54s. to 55s. f.o.b. West Coast—Manchester, 48s. to 49s.; Liverpool, 49s. to 50s. Clyde, 53s. to 54s. Benzole, 90 p.ct. North, 1s. 7½d. to 1s. 8½d.; crude, 65 p.ct., at 120° C., 1s. to 1s. 1d., naked at makers' works; 50-90 p.ct., naked, North, 1s. 7½d. to 1s. 8½d. Toluole, naked, North, 1s. 6½d. to 1s. 7½d., nominal. Coal-tar crude naphtha, in bulk, North, 7½d. to 8½d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 6d. Heavy naphtha, North, 1s. to 1s. 1d. Creosote, in bulk, North, liquid, 6⅝d. to 6⅞d.; salty, 6d. to 6⅛d.; Scotland, 5⅞d. to 6d. Heavy oils, in bulk, North, 6¼d. to 6⅜d. Carbolic acid, 1s. 4d. to 1s. 5d. prompt. Naphthalene, £11 to £14; salts, £4 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

TRADE NOTES.

Naphthalene Chamber Washer for Lancaster.

The tender (£921) of Messrs. W. C. Holmes & Co., of Huddersfield, has been accepted for the supply and erection of a naphthalene chamber washer for the Lancaster Corporation Gas-Works.

Tanks of All Types.

An interesting booklet entitled "Welding Makes a Better Job" has just been published by Messrs. Robert Jenkins & Co., Ltd., of Rotherham. In this are described many types of their welded tanks.

Remodelling a Hotel Kitchen.

Messrs. R. & A. Main, Ltd., of London, have recently carried out the remodelling of the kitchen, service room, and boiler house installations at the Queen's Hotel, Cheltenham, now under the direction of the Honeywood Hotels, Ltd. It is interesting to note that the remodelling was completed in time for use on the occasion of the Duchess of York's recent visit to Cheltenham, when Her Grace was accommodated at the Queen's.

CONTRACTS OPEN.

Resetting Retort Beds.

Tenders are invited by the Gas Department of the Clacton Urban District Council for the resetting of two beds of retorts. [See advert. on p. 746].

Steel Main.

The Milton Regis Urban District Council are inviting tenders for the supply of about 800 yards of 6-inch steel main. [See advert. on p. 746].

EXTENSIONS.

Burton-on-Trent.

A decision to apply for permission to borrow £20,000 for the extension of gas mains during the next few years was made at a meeting of Burton-on-Trent Town Council on Wednesday last. It was also decided to erect a new carburetted water gas plant—the cost (£28,450) to come out of the revenue.

A Big Loan for Coventry.

Mr. A. W. Brightmore has held an inquiry at Coventry into the application of the City Council to the Ministry of Health for sanction to a loan of £230,000 for extensions to the gas-works at Foleshill. These works were opened in 1909, for a production of 8,860,000 c.ft. a day; whereas the maximum daily demand this year has been 8,095,000 c.ft., 40 p.ct. of which was for industrial purposes. Since the undertaking was purchased by the Corporation, the demand for gas has doubled every twelve years; and the proposed extensions are only estimated to be capable of meeting the demand until 1934. The area supplied is 28,611 acres, with a population of 156,833.

New Joint-Stock Company.—The "At-Once" Geyser (Parent Syndicate) has been registered with a capital of £1000, to acquire from the Lincoln Engineering Company a patent relating to heating appliances, and to carry on the business of engineers.

Askam-in-Furness Gas-Works.—The accounts of the Dalton Urban District Council for the year ended March 31 last include those of the small gas-works at Askam-in-Furness, which show a debit balance to the District Council accounts of £100. The quantity of gas made was 7,379,600 c.ft. There are about 500 consumers.

Italian Gas.—According to a statement by Signor Panzarasa, Chairman of the Societa Italiana per il Gas, at an extraordinary meeting of shareholders, the Company had obtained credit in New York for $5,000,000 at 7 p.ct., or 8¼ p.ct. inclusive of all charges, the Company pledging part of their investments in other companies. The Company propose to increase their capital by 16,000,000 lire to 130,000,000 lire.

Reconstruction of the Blackburn Gas-Works.—There has been an interesting conversion at the Blackburn Corporation Gas-Works at Greenbank; the old inclined retort house having been reconstructed to serve the purpose of employees' canteen, mechanics' workshop, cooker room, general stores, and a department for the manufacture of sulphate of ammonia. The remodelled building was formally opened on Dec. 10 by Councillor E. Hamer, J.P., Chairman of the Gas Committee.

Royal Sanitary Institute Jubilee.—The Royal Sanitary Institute, who have been working for fifty years in the cause of public health, will celebrate their jubilee by holding an Imperial Congress in London next year from July 5 to 10. The Right Hon. Neville Chamberlain, M.P., Minister of Health, has accepted the Presidentship of the congress. The Lord Mayor and Corporation of the City of London are co-operating by granting the use of the Guildhall for the opening meeting. The work of the congress will be divided into six sections and seven conferences.

Gas Light and Coke Company's Standard Price.—The report and recommendation of the Public Control Committee as appearing on p. 699 of last week's "JOURNAL" were adopted without discussion at the meeting on Dec. 8 of the London County Council. The recommendation was: "That, in connection with the application of the Gas Light and Coke Company to the Board of Trade for an Order under section 1 (3) of the Gas Regulation Act, 1920, to permit of an increase in the Company's standard price of gas from 11d. to 11·4d. a therm, representations be submitted to the Board to the effect that, while it is not desired to offer objection to the application of the Company, (i) the Council do not agree with the method of calculation adopted by the Company in determining the increase in the cost of supply, nor (ii) with the Company's figures in their estimate of present cost, and (iii) that, in refraining from opposition, the Council should not be prejudiced as regards future applications by gas companies for alterations of the standard price."

Members of the Blackburn Textile Society visited on Dec. 12 the Greenbank Gas-Works of the Corporation, and were keenly interested in all they saw. There was a party of over 120.

On Monday, Dec. 7, the Walton-le-Dale District Council accepted the offer of the Preston Gas Company to pay half the initial cost of making Hannel Lane fit to carry the material to be used in the erection of their new gas-works, and the whole cost of street repair while the works are under construction. A Sub-Committee was appointed to inspect the road and decide upon the work to be done.

The Middlesbrough Corporation have decided to extend the system of high-pressure gas lamps over a 570 yards stretch of Linthorpe Road. This portion is at present lighted by 18 low-pressure lamps, giving an average of 5400 c.p., at a cost of £99 per annum; and it is estimated that if these are displaced by 14 high-pressure lamps, the aggregate candle power will be 14,000, costing £154 for gas, mantles, and labour for cleaning.

The officials of the Sunderland Gas Company had their annual whist drive and dance in the Edward and Alexandra Halls on Dec. 10, when about 160 members of the staff and their friends had an enjoyable evening. The whist prizes, which had been given by Mr. and Mrs. N. S. Cox, Mr. and Mrs. Dru Drury, and several other principal officials, were presented by Mrs. C. Dru Drury, who was introduced by Mr. Cox. A vote of thanks was moved by Mr. J. Knott for the kindly way in which Mrs. Drury had carried out her duties.

Mr F. A. Frost (President of the Works Foremen's Association of the South Metropolitan Gas Company) took the chair on Tuesday, Dec. 8, at a lecture by Mr. W. J. Liberty on "Underground London." The lecture was given in the Institute at the back of Christ Church, Old Kent Road—a church which was erected by the South Metropolitan Gas Company to take the place of one demolished by them, in consequence of works extensions, many years ago.

Concerning a recent Press report respecting a fatal accident to two gasfitters employed by the Glasgow Corporation Gas Department, we learn that the fitters were not sent to locate and repair a leakage of gas, as stated in the Press, but to clear a choked service pipe. The choke was evidently located by them in a tee-piece under the front entrance to the close and situated in a very confined place. Instead of handing-over the work to the street mains section, for them to open-up the ground, as is usual in such cases, they selected to risk unscrewing the plug in the tee, and probably experienced difficulty in replacing it, with fatal results to themselves. They were acting contrary to both custom and instructions in venturing on this work, as for some years now the use of underground tees has been prohibited, and workmen have been encouraged to leave all underground repairs to be dealt with by street mains workmen after disconnecting the connector near the main.

STOCK MARKET REPORT.

WITH the close of the year rapidly approaching, it was not surprising that business, except in Rubbers, which had rather a hectic time, eased off last week. At the week-end an abnormal number of new issues were announced. With Christmas nearly upon us, doubts have been expressed as to the wisdom of attempting these flotations, and much sympathy is being extended to the underwriters, who it is feared will be left with a large proportion of their commitments. Shipping, represented by the Cunard Company, and British Tankers, Dunlop Rubber Company, Western Viscose Silk Mills, Drapery and General Investment Trust, and the German Textile Trades Corporation are included in the list. The sensation of the week was the proposed drastic re-organization of the Vickers capital.

Gas Stocks and Shares, which eased up during the previous week, showed no improvement. The uncertainty of the labour position partly accounts for this; but another, and in fact the more important, factor is the price of coal. A month ago, when Durham Specials were selling f.o.b. at about 15s. per ton, the industry was hopeful for the future; but considerable doubts are now being voiced with regard to the position in April next, when the subvention comes to an end; and the collieries are now very loth to make contracts ahead. The decision of the London County Council not to oppose the application of the Gas Light and Coke Company for a revision of their standard price indicates a sweet reasonableness not always apparent in the Council's decisions. It may not be generally known that, should the revision be made before the close of the year, the new Order takes effect for the current half-year. Such prompt action is, however, a little too much to expect. The changes in the quotations of ordinary stocks or shares were unimportant. Malta and Mediterranean, Montevideo, and South Metropolitan showed slight improvements; while European and Primitiva, and, on the Home Exchange, Newcastle, South Shields, and Tynemouth, were marked down.

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf.Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Dec. 11.	Rise + or Fall − on Week.	Transactions Lowest and Highest Prices.
£			% p.a.	% p.a.				
171,978	Stk.	Aug. 13	5	5	Aldershot 5 p.c. max. C.	75—78	..	..
322,992	,,	,,	4	4	Do. 4 p.c. Pref.	70—75	..	71—72
1,551,868	,,	Oct. 8	6½	6½	Alliance & Dublin Ord.	68—72	..	70—70½
374,000	,,	July 9	4	4	Do. 4 p.c. Deb.	60—65	..	..
300,000	1	Oct. 22	1/7½	1/7½	Bombay, Ltd.	½—1	..	19/6
170,000	10	Aug. 13	8½	8½	Bournemouth 5 p.c.	12—13	..	12½
425,050	10	,,	7	7	Do. B 7 p.c..	12—12½	..	12½—12½
150,000	10	,,	6	6	Do. Pref. 6 p.c..	11—12	..	..
50,000	Stk.	June 25	3	3	Do. 3 p.c. Deb..	56—59	..	..
162,025	,,	,,	4	4	Do. 4 p.c. Deb..	77—80	..	..
992,045	,,	July 9	6⅞	6⅞	Brentford A Con.	98—103	..	..
990,500	,,	,,	6⅞	6⅞	Do. B New	98—103	..	101
76,000	,,	,,	5	5	Do. 5 p.c. Pref.	95—98	..	97—98
506,690	,,	June 11	4	4	Do. 4 p.c. Deb.	76—81	..	78½—81
181,337	,,	,,	6	6	Do. 6 p.c. Rich. Red. Deb.	100—105	..	..
214,740	,,	Aug. 27	12½	12	Brighton & Hove Orig.	170—175	..	171
244,200	,,	,,	9½	9	Do. A Ord.	137—142	..	..
1,287,500	,,	July 23	5	5	Bristol 5 p.c. max..	89—91a	..	..
855,000	,,	Oct. 8	7	8	British Ord.	105—110	..	106½—106
100,000	,,	June 25	7	7	Do. 7 p.c. Pref..	120—125	..	..
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb.	71—76	..	..
100,000	10	May 21	6	8	Cape Town, Ltd.	6¾—7¾	..	..
100,000	10	Nov. 5	4½	4½	Do. 4½ p.c. Pref..	6½—6¾	..	..
150,000	Stk.	June 25	4½	4½	Do. 4½ p.c. Deb..	70—75	..	..
626,860	,,	July 23	6	6	Cardiff Con. Ord.	98—101	..	..
237,860	,,	June 25	7½	7½	Do. 7½ p.c. Red. Deb.	101—104	..	..
157,150	,,	Aug. 13	6¾	5	Chester 5 p.c. Ord.	90—95b	..	..
1,513,280	,,	July 23	5/14/8	5½	Commercial 4 p.c. Cap.	81—86	..	81—84
580,000	,,	,,	,,	5/3/4	Do. 3½ p.c. Cap.	81—86	..	81—82½
475,000	,,	June 11	3	3	Do. 3 p.c. Deb.	56—59	..	..
800,000	,,	Oct. 8	—	4	Continental Union, Ltd.	35—40	..	35
200,000	,,	,,	7	7	Do. 7 p.c. Pref.	87—90	..	89½—90
660,000	,,	Aug. 13	6½	6½	Croydon sliding scale	97—101	..	..
284,975	,,	,,	5	5	Do. max. div.	81—84	..	..
492,870	,,	June 25	4	6	Derby Con.	107—109c	..	..
55,000	,,	June 25	4	4	Do. Deb.	74—76c	..	..
1,002,180	10	July 23	4	6	European, Ltd.	6—7	—½	6½—6½
16,460,070	Stk.	Aug. 13	5½	5½	Gas Light & Coke 4 p.c. Ord.	85—87	..	85—86½
2,800,000	,,	,,	3½	3½	Do. 3½ p.c. max.	60—63	..	60
4,068,235	,,	,,	4	4	Do. 4 p.c. Con. Pref.	77—80	..	79—80
4,761,930	,,	June 11	3	3	Do. 3 p.c. Con. Deb.	60—63	..	60—61
130,000	,,	—	10	10	Do. 10 p.c. Bonds	..	..	..
42,000	,,	—	7½	7½	Do. 7½ p.c. Ilford Deb.	..	..	..
82,500	,,	Sept. 10	6½	6½	Hastings & St. L. 5 p.c. Conv.	90—95	..	..
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	71—76	..	..
70,000	10	Sept. 24	10	10	Hongkong & China, Ltd.	19½—20½	..	..
16,600	Stk.	Aug. 13	10	10	Hornsey 7 p.c.	132—137	..	..
1,676,000	,,	Nov. 19	39	10	Imperial Continental Cap.	135—140	..	70½—7 ½
226,170	,,	Aug. 13	3½	3½	Do. 3½ p.c. Red. Deb.	70—73	..	98—99
235,242	,,	Aug. 13	6½	6½	Lea Bridge 5 p.c. Ord.	97—102	..	82½—82½
2,127,340	,,	Aug. 13	5½	5½	Liverpool 5 p.c. Ord.	83—84b	..	..
600,000	,,	Sept. 24	7	7	Do. 7 p.c. Red. Pref.	101½—103½b	—	—
169,736	,,	Aug. 27	8	9	Maidstone 5 p.c. Cap.	118—128	..	..
63,480	,,	June 25	3	3	Do. 3 p.c. Deb.	55—60	..	..
75,000	5	Dec. 3	7	6	Malta & Mediterranean	4½—3*	+½	5
341,920	Stk.	Nov. 19	4	4	Montevideo, Ltd.	68—72	+3	70
1,061,315	,,	Aug. 13	5	5	Newcastle & Gateshead Con.	69—71d	—½	69½
300,929	,,	,,	4	4	Do. 4 p.c. Pref..	75½—76½d	..	..
329,705	,,	June 25	3½	5½	Do. 3½ p.c. Deb.	68—69d	..	..
15,000	,,	Aug. 27	12	11½	North Middlesex 10 p.c.	160—170	..	..
75,940	,,	,,	8⅝	8⅝	Do. 7 p.c.	113—120	..	..
300,000	Stk.	Dec. 3	7	9	Oriental, Ltd.	98—103*	..	101—102
188,120	,,	June 25	7½	7½	Plym'th & Ston'house 5 p.c.	112—117	..	..
60,000	50	Aug. 27	14	14	Portsea Island B	93—96	..	..
100,000	50	,,	13	13	Do. C	90—93	..	..
2,289,909	1	—	—	—	Primitiva Ord.	11/3—12/3	—/3	11/6—12/3
302,600	100	Dec. 1	4	4	Do. 4 p.c. Red. Deb..	82—84*	..	83½—84
600,000	Stk.	July 23	4	4	Do. 4 p.c. Red. Deb. 1911	64—66	..	..
193,744	,,	June 25	4	4	Do. B. Aires 4 p.c. Rd. Db.	65—67	..	..
264,496	,,	,,	4	4	Do. R'r P'te 4 p.c. Rd. Db.	65—67	..	..
150,000	10	Sept. 24	6	6	San Paulo 6 p.c. Pref.	7½—8	..	..
125,000	50	July 1	5	5	Do. 5 p.c. Red. Deb.	42—45	..	..
870,000	Stk.	Aug. 27	5½	5½	Sheffield A	99—101e	..	..
419,968	,,	,,	5½	5½	Do. B	99—100e	..	100
1,047,000	,,	,,	5½	5½	Do. C	99—100e	..	..
90,000	10	June 11	6	4	South African	5—7	..	..
4,609,895	Stk.	Aug. 13	6½	5	South Met. Ord.	93½—95½	+½	94—95½
1,495,445	,,	July 9	3	3	Do. 3 p.c. Deb.	57—60	..	58½—59
734,000	,,	Sept. 10	6½	6½	Do. 6½ p.c. Red. Deb.	103—105	..	104—105
91,500	,,	Aug. 13	8½	8½	South Shields Con.	129—131d	—1	..
1,117,795	,,	July 23	6½	6½	South Suburban Ord. 5 p.c.	99—103	..	..
368,837	,,	June 25	5	5	Do. 5 p.c. Deb.	95—98	..	96
647,740	,,	Oct. 22	5	5	South'mpt'n Ord. 5 p.c. max.	78—81	..	79
121,475	,,	June 25	4	4	Do. 4 p.c. Deb.	70—73	..	72—74
250,000	,,	Aug. 27	7	7	Swansea 7 p.c. Red. Pref..	100—102	..	101½—102
800,000	,,	June 25	6½	6½	Do. 6½ p.c. Red. Deb..	101—103	..	..
220,000	,,	July 23	8	7½	Tottenham District A 5 p.c.	110—115	..	113
882,275	,,	,,	6½	5½	Do. B 3½ p.c.	88—93	..	90½—91½
150,000	,,	July 9	—	28/4	Do. 5½ p.c. Pref.	103—105	..	..
181,235	,,	June 11	4	4	Do. 4 p.c. Deb.	76—79	..	77½
258,251	,,	Aug. 27	5	5	Tynemouth Con. and New	69—71d	—1	..
197,284	,,	Aug. 27	6½	6½	Uxbridge, Maidenhead, & Wycombe 5 p.c..	93—98	..	..
88,330	,,	,,	5	5	Do. 5 p.c. pref.	93—98	..	..
91,800	,,	,,	6½	6½	Do. 5 p.c. Maidenh'd	88—93	..	..
30,000	,,	July 9	9½	8½	Wandsworth, Wimbledon, and Epsom— Wandsworth A 5 p.c.	128—133	..	..
455,636	,,	,,	7½	7	Do. B 3½ p.c.	109—114	..	..
399,955	,,	,,	6/9/6	5/19/0	Do. C and New	92—97	..	95
358,000	,,	,,	7½	6½	Wimbledon 5 p.c.	103—108	..	106½
90,000	,,	,,	7½	7½	Epsom 5 p.c.	113—118	..	..
88,416	,,	June 25	5	5	5 p.c. Deb.	56—59	..	..

Quotations at:—*a*,—Bristol; *b*,—Liverpool, *c*,—Nottingham, *d*,—Newcastle; *e*,—Sheffield, *Ex. div.

The following transactions were recorded during the week:

On Monday, Alliance and Dublin 70, 70¾, Brentford "B" 101, 5 p.ct. preference 97, 98, 4 p.ct. debenture 77½, Commercial 4 p.ct. 83, Gas Light and Coke 85¼, 85½, 85⅝, 86, 86¼, 4 p.ct. preference 79, 79¼, 80, 3 p.ct. debenture 60, Imperial Continental 137, Primitiva 11s. 9d., 11s. 9⅜d., 12s. 3d., South Metropolitan 94, 94¼, 94½, 94⅝, 95, 3 p.ct. debenture 58⅜, 59.

On Tuesday, Aldershot 4 p.ct. preference 72, Bournemouth original 12½, "B" 12½, Brentford "B" 101, Commercial 4 p.ct. 81, 84, 3½ p.ct. 81, Continental Union 35, Gas Light and Coke 85¼, 85½, 85⅝, 86¼, 86½, 3½ p.ct. maximum 60, 3 p.ct. debenture 60⅜, Imperial Continental 137, 138½, 3¼ p.ct. debenture 70½, 71⅜, Lea Bridge 98, Oriental 101, 101½, 102 *ex* div., Primitiva 11s. 9d., 12s., South Metropolitan 94, 94¼, 94½, 94⅜, 95¼, Tottenham "A" 113, Wandsworth (Wimbledon stock) 106½. Supplementary prices, Liverpool 5 p.ct. 82½, 82⅜, Southend-on-Sea 5 p.ct. 84.

On Wednesday, Alliance and Dublin 70, Bombay 19s. 6d., Bournemouth "B" 12½, Brentford 4 p.ct. debenture 78½, Brighton and Hove original 171, British 106½, 106⅜, Commercial 4 p.ct. 82, 82½, 3½ p.ct. 82½, Gas Light and Coke 85¼, 85½, 85⅜, 4 p.ct. preference 79, 3 p.ct. debenture 60½, 61, Imperial Continental 136, 136½, Lea Bridge 99, Primitiva 11s. 9d., 4 p.ct. debentures 83½ *ex* div., South Metropolitan 94, 94¼, 94⅜, 6½ p.ct. debenture 104, 105, South Suburban 5 p.ct. debenture 96, Swansea 7 p.ct. preference 101⅜, 102, Tottenham "B" 90½. Supplementary prices, Southend-on-Sea original 85.

On Thursday, Continental Union 35, European 6¼, 6½, Gas Light and Coke 85½, 85⅝, 85⅞, 3 p.ct. debenture 60⅜, Malta and Mediterranean 5 *ex* div., Montevideo 70, Primitiva 11s. 6d., 11s. 9d., 11s. 10½d., 4 p.ct. debenture 84 *ex* div., South Metropolitan 94, 94¼, 3 p.ct. debenture 58⅜, 6½ p.ct. debenture 104½, 104¾, Southampton 79, 4 p.ct. debenture 72, 74, Tottenham "B" 90¼, 91½.

On Friday, Aldershot 4 p.ct. preference 71, Brentford 4 p.ct. debenture 81, Continental Union 7 p.ct. preference 89½, 90, European 6¼, Gas Light and Coke 85, 85¼, 85⅜, 85⅝, 85⅞, 86, 3 p.ct. debenture 61, Imperial Continental 135, 136, 137½, Malta and Mediterranean 5 *ex* div., Newcastle 3½ p.ct. 69⅜, Oriental 101½ *ex* div., Primitiva 11s. 6d., 11s. 10½d., South Metropolitan 94, 94⅜, 94½, Tottenham "B" 90, 90¼, 90½, 4 pct. debenture 77⅜. Supplementary prices, Barnet "A" 148, Danish 5, Malta and Mediterranean 1st (7 p.ct. preference) 5, Southend-on-Sea 4 p.ct. debenture 71½, 72, Wandsworth 3½ p.ct. new 95.

A further rise had been anticipated in the Treasury Bill rate, but the actual result was higher than had been expected. The average rate—£4 14s. 3·75d. p.ct.—was 3s. 0·70d. above the previous week's rate, and the higher discount rate probably accounted for this. Although there was a slight improvement in the gold position, the exports on the week again exceeded the imports. Money was fairly abundant.

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